Paper

SEPTEMBER 7, 1950

MILL EQUIPMENT NUMBER

WOOD PULP

G

Established 1886

"To know what were good to do."
SHAKESPEARE

Every industrial era poses its own particular problems. This is inevitable for problems emerge from the times and conditions that created them. Yet, out of hard-won experience, the seasoned organization has much to offer that can aid in planning ahead.

In its own span of more than sixty years, this house has helped clients meet the challenge of each period and go forward to new goals.

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29 CYLINDER BOARD MACHINES NOW DELIVER A BETTER SHEET

It's no secret among the men who make paperboard that Downingtown's scientifically engineered Approach Flow Vat System is the one *sure* way to get a quality sheet that has uniform weight and caliper across the machine. After more than a hundred vat installations and experience over a large range of furnishes, we have the answer to your problem, and the men who are using the System know we have . . . Everything possible has been done to insure even dispersion of the fibres right up to the mould, aad to reduce entrained air to a minimum.

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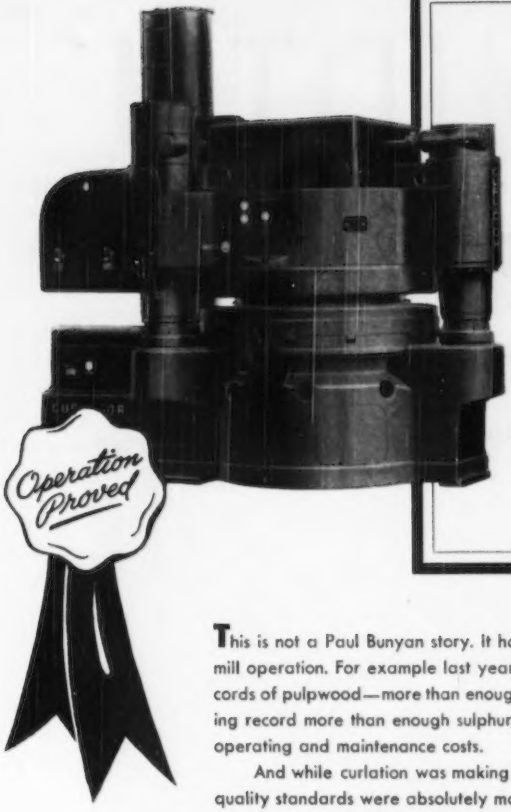
Approach Flow Vat System

DOWNINGTOWN MANUFACTURING COMPANY

DOWNINGTOWN, PA.

Pacific Coast Representative: JOHN V. ROSLUND, Pacific Bldg., Portland 4, Ore.

DESIGNERS AND BUILDERS OF PAPER AND BOARD MAKING MACHINERY SINCE 1880



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IN WOOD SAVINGS ALONE IN A NEWSPRINT MILL†

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ROTARY KILNS

For

REBURNING LIME SLUDGE

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F. L. Smidth & Co. are specialists in the design and manufacture of rotary kilns and have furnished numerous installations in many countries for burning lime, lime sludge, dolomite, magnesite, cement, ores, etc.

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PUBLISHED EVERY THURSDAY

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Secretary

VOL. 131 **SEPTEMBER 7, 1950** **NO. 9**

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DATES TO REMEMBER

SEPTEMBER 11-23: 6th Educational Graphic Arts Exposition, International Amphitheatre, Chicago, Ill.

SEPTEMBER 13-15: Second Testing Division Conference, Eastman Kodak Co. plant, Rochester, N. Y.

SEPTEMBER 14-16: Southern Paper Trade Assn., Sheraton Plaza Hotel, Daytona Beach, Florida.

SEPTEMBER 14-17: American Pulp & Paper Mills Supts. (New York-Canadian Div.) Convention, Chateau Laurier Hotel, Ottawa, Ont., Canada.

OCTOBER 2-5: Fifth Engineering Conference of the Pulp and Paper Industry, Netherland Plaza Hotel, Cincinnati, Ohio.

OCTOBER 11-13: Fifth Annual Symposium on "Instrumentation for the Process Industries," Agricultural and Mechanical College of Texas, College Station, Texas.

OCTOBER 12-14: American Pulp & Paper Mills Supts. (Southern and Southeastern Div.) Annual Meeting, George Vanderbilt Hotel, Asheville, N. C.

OCTOBER 16-20: 38th Safety Congress and Exposition, Chicago, Ill.

OCTOBER 23-25: National Paper Trade Assn., Fall Convention, Stevens Hotel, Chicago, Ill.

OCTOBER 25-27: Alkaline Pulping Conference, George Washington Hotel, Jacksonville, Fla.

OCTOBER 30-31 NOVEMBER 1: 37th National Foreign Trade Convention, The Waldorf-Astoria, New York, N. Y.

NOVEMBER 27:—DECEMBER 2: 19th National Exposition of Power and Mechanical Engineering, Grand Central Palace, N. Y.

DECEMBER 3-6: American Institute of Chemical Engineers, Annual Meeting, Neal House, Columbus, Ohio.

THIS WEEK

Annual Mill and Mill Equipment Issue

NEXT WEEK

Results on Testing Surface Waterproofings by F. O. Anderegg.

Economic Aspects of Papermaking Fibrous Raw Materials by Dr. L. F. Stevenson.

Fine Paper Production from Bagasse by F. G. L. Becker.

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GOSH! MAN, IT'S *PERFECT...*

Buyer: This is what we have been hoping for. Perfect finish on both sides. How do you get them that way? Some secret process, I suppose.

Mill Man: No secret about it. The sheet is carried from the wires through the first press on a Hamilton "wet" Felt. Then it goes through the second press on another Hamilton Felt that finishes the front side. From there it passes through a reverse third press on another Hamilton Felt that finishes the back side exactly the same as the front.

Buyer: Doesn't it slow down the machine to use three presses instead of only one?

Mill Man: On the contrary. Three Hamilton Felts remove so much water that very little time is needed at the driers. Machine runs top speed—turns out more tonnage and brings the cost down.

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Miami Woolen Mills

Hamilton *Felts*

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for cleanness

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CALCO CHEMICAL DIVISION
DYESTUFF DEPARTMENT
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- Rotors on stock and liquor pumps are adjustable for wear. This extends periods between liner replacement.

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CENTRIFUGAL PUMPS • WORM GEAR SPEED REDUCERS • IMO OIL PUMPS

PP-1

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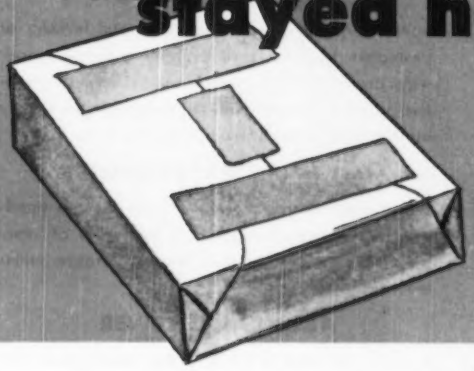
...this little package stayed home



Two manufacturers make products of equal quality. But the top one sells and sells while "Cinderella", lower left, gathers dust in some stock room. Attractive, neat packaging's the answer. Lynch MORPAC Paper Packaging Machine does away with tape sealing, loose corners, soft edges, produces up to 1,000 neat, trim units an hour saving you up to 40% on wrapping material alone. Products such as loose leaf fillers, tablets and pads, ream paper, books or any rectangular object within its size range are ideally suited for Lynch MORPAC's operation. If you want your wrapper to sell product quality too, write now for more details on Lynch MORPAC.

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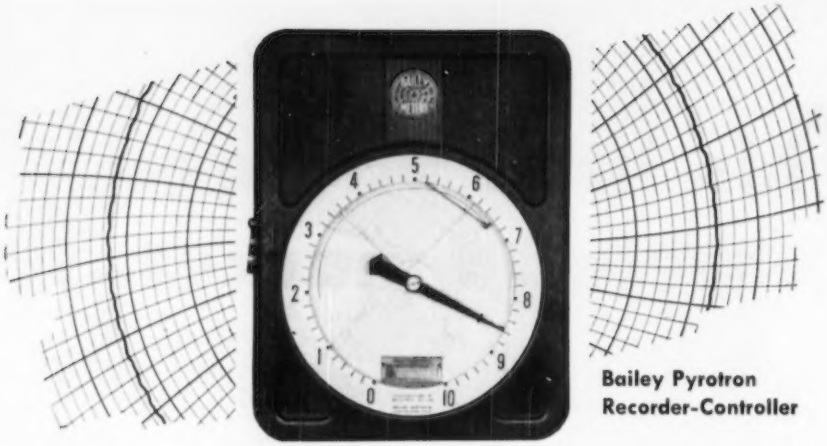

Bailey Pyrotron
Recorder-Controller

Looking for Better Temperature Instruments?

. . . Then check these features of Pyrotron Electronic Resistance Thermometers . . .

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Bailey Pyrotron Resistance Elements are made of highest purity platinum—the material used by the National Bureau of Standards in establishing basic standards for temperatures from −190°C to +660°C.

THREE TYPES OF CONTROL

Pyrotron Controllers may operate: on-off electrical systems by either electronic relays or electric contacts, modulated electronic systems, or air-operated systems. Two temperatures may be recorded on the same chart and controlled by a single instrument.

FACTS PUT INTO USABLE FORM

Bailey Pyrotrons may be arranged to put temperature facts into convenient usable forms. If two or more temperatures are related, they may be recorded as continuous records on the same chart for easy comparison. The average of several temperatures or the difference between two temperatures may be recorded as a single continuous record which may be retransmitted to a distant point or used to actuate a control system.

EASY INSTALLATION

Bailey Pyrotrons do not require careful leveling or protection against vibration. Three ordinary copper wires are all that is needed to connect each temperature sensitive element with the recorder. Power may be taken from any 115 volt 60 cycle circuit.

MINIMUM MAINTENANCE

The absence of galvanometers, batteries and standardizing equipment, together with the use of interchangeable unit assemblies, reduces Pyrotron maintenance to the vanishing point.

ABUNDANT POWER

A separate motor drive for each temperature furnishes abundant power to operate a recording pen, a controller and an alarm switch.

For the full story on this unusual electronic resistance thermometer which is suitable for ranges between −300°F and 1200°F, ask for Bulletin No. 230-C. P-21

BAILEY METER COMPANY

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Controls for Processing

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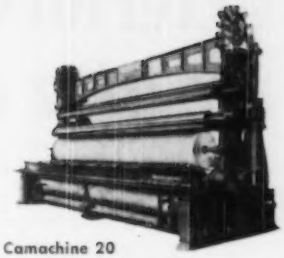

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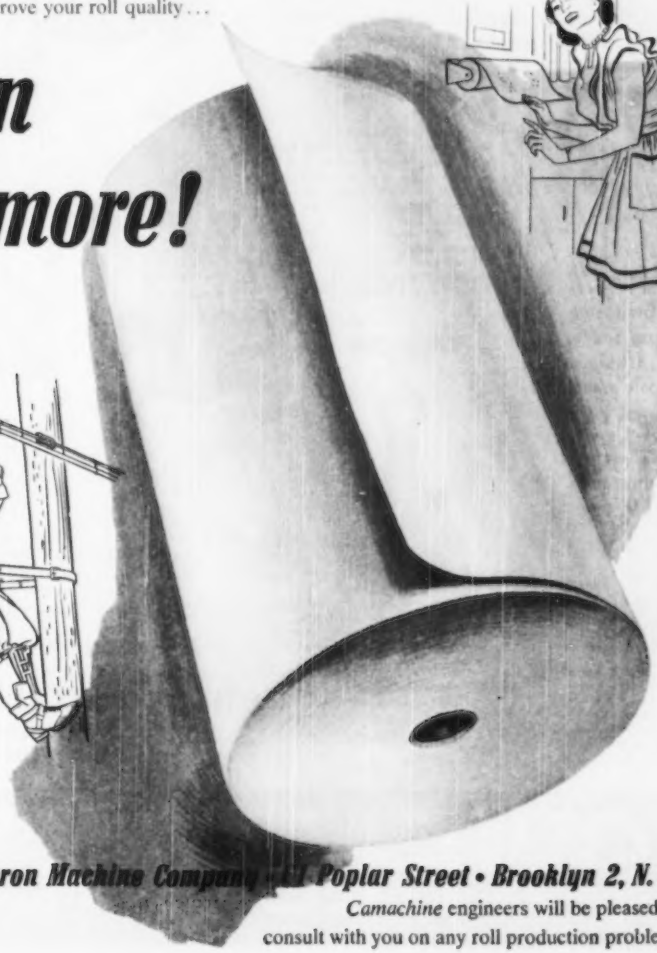
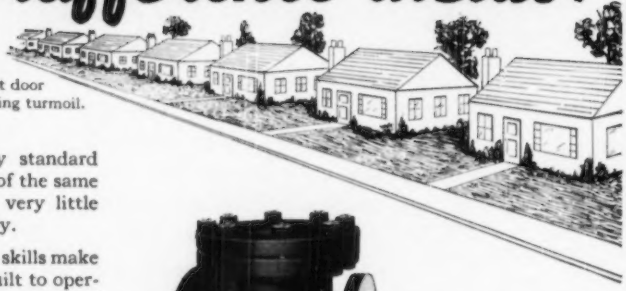


Cameron Machine Company ***61 Poplar Street • Brooklyn 2, N. Y.***

Camachine engineers will be pleased to consult with you on any roll production problem.

AA-229

The exteriors may look alike— but *what a difference inside!*



Inside one home, life goes on smoothly and harmoniously. But in the house next door there's constant friction and nerve-wearing turmoil.

Compare the outside appearance of any standard Powell valve with that of any other valve of the same type and size. You will probably notice very little difference. But inside—that's another story.

There design, materials and manufacturing skills make the difference between a Powell Valve—built to operate smoothly and efficiently over a long period of time—and a valve that will have only a short life before it requires maintenance or even replacement.

Powell also makes many *exclusive* patterns to meet the requirements of special services. In these, too, long trouble-free performance is a primary consideration.

Fig. 559—125-pound Iron Body Bronze Mounted Swing Check Valve with flanged ends, bolted flanged cap and regrindable, renewable bronze seat and disc.

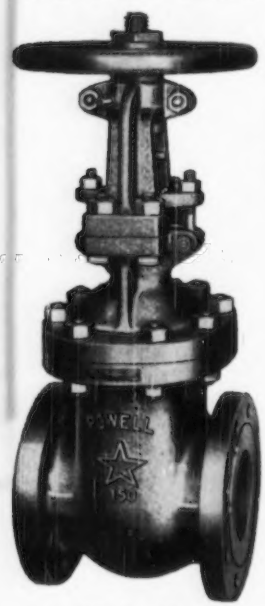


Fig. 1503—Class 150-pound Cast Steel Gate Valve with flanged ends, outside screw rising stem, bolted flanged yoke, tapered solid wedge.

Flanged End O. S. & Y. Gate Valve, 150 pounds W. P. Face-to-face dimension conforms to MSS SP42.
Figs. 2471 (Solid Wedge) and **2486** (Double Wedge) available in 18-8S, 18-8S Mo, Durimet "20."
Figs. 2473 (Solid Wedge) and **2488** (Double Wedge) available in Nickel, Monel Metal, Ampco Alloys, Everdur Hastelloy Alloys A-B-C-D.
Also made with Screwed Ends.

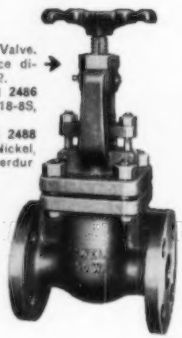


Fig. 2608—Bronze Globe Throttling Valve with full flow through the seat when wide open. Special bronze stem and stainless steel seat and disc hardened to approximately 500 Brinell.

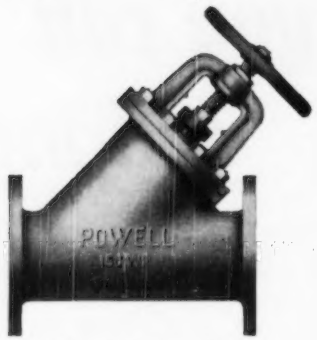


Fig. 1944 — Large 150-pound Stainless Steel "Y" Valve with flanged ends, bolted flanged yoke-bonnet and outside screw rising stem.

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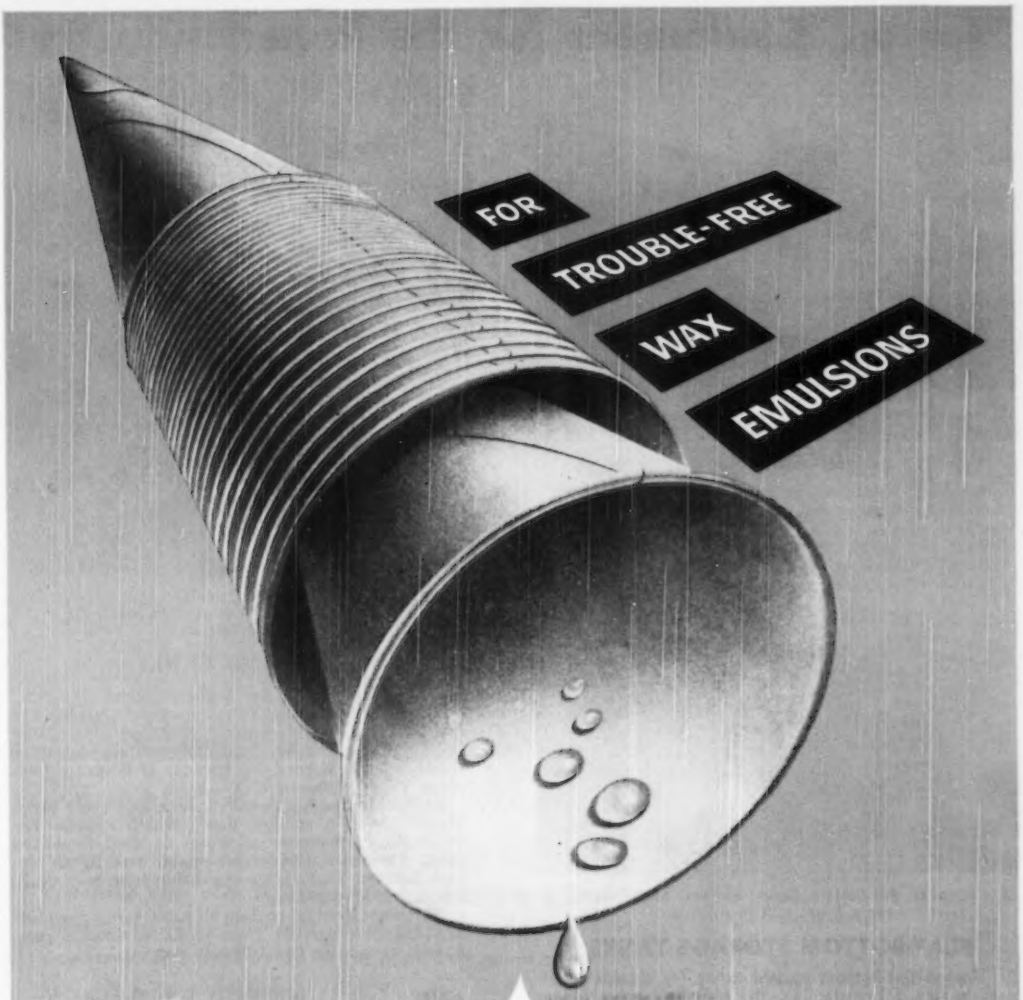

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Horton* Equipment for the Paper Industry

A 9-ft. 10⅛ in. diam. by 36 ft. 7 in. digester built of 20 per cent stainless clad steel for a pulp mill in Australia.

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Horton flat-bottom welded tanks for liquids and solids are fabricated in the standard capacities from 500 to 180,000 bbls. They are also furnished in special sizes to meet specific requirements. Riveted tanks are available if desired

Storage tanks for water and other non-volatile liquids are usually equipped with conical steel roofs. Umbrella roofs will be installed, however, if desired.

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100,000-gal. elevated water tank for the sprinkler system at the Fibreboard Products Company mill in East Antioch, Calif.

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Acid Accumulators
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cut costs and speed handling

The right kind of chain does it

Many tough conveying jobs in the Pulp and Paper Industry are made easy once Jeffrey Engineers get the call. They can offer a complete material handling service — rugged and dependable units engineered to cut costs and speed production through various processes.

Pulpwood Conveyor shown here — of simple and economical design — is equipped with Jeffrey PW 132 Chain noted for its extra heavy wearing qualities. Here again Jeffrey-equipped means efficient operation. Take advantage of Jeffrey experience and specialized engineering.

Equipment for the Pulp and Paper Mill:

- Belt Conveyors
- Chains
- Chip Conveyors
- Crushers (salt cake)
- Elevators (bucket)
- Feeders (lime — salt cake)
- Log Haul-ups
- Re-chippers
- Screenings Grinders
- Shredders
- Unloaders (barge)

Send for Data

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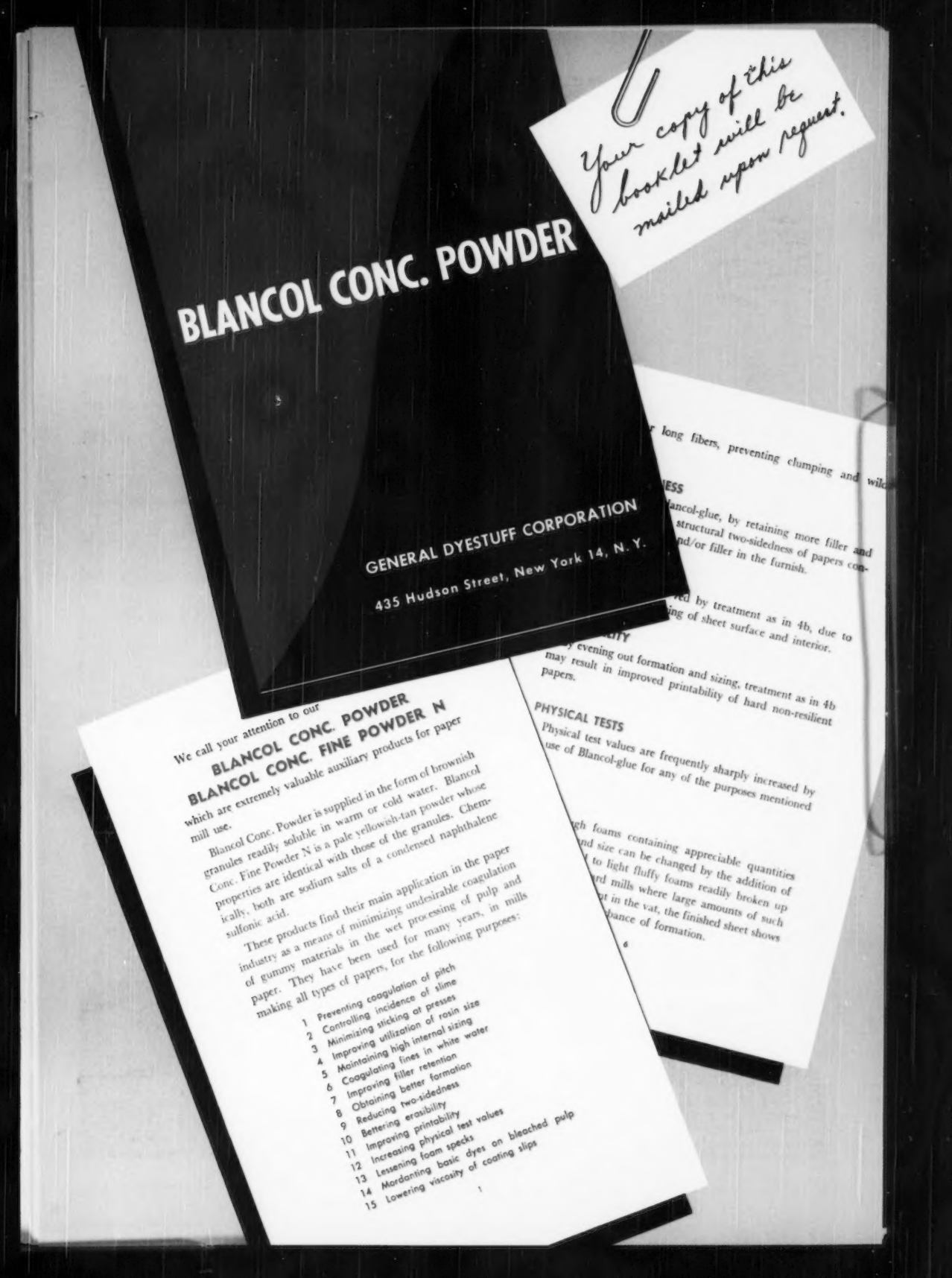
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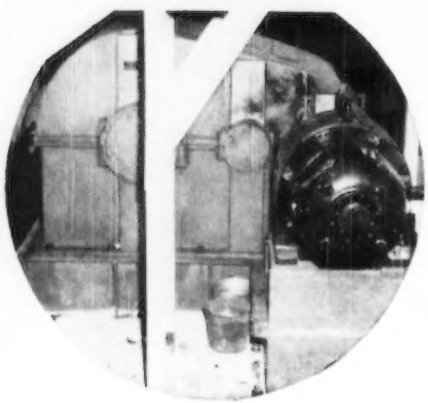
These products find their main application in the paper industry as a means of minimizing undesirable coagulation of gummy materials in the wet processing of pulp and paper. They have been used for many years, in mills making all types of papers, for the following purposes:
1 Preventing coagulation of pitch
2 Controlling incidence of slime
3 Minimizing sticking at presses
4 Improving utilization of rosin size
5 Maintaining high internal sizing
6 Coagulating fines in white water
7 Improving filler retention
8 Obtaining better formation
9 Reducing two-sidedness
10 Bettering erasibility
11 Improving printability
12 Increasing physical test values
13 Lessening foam specks
14 Mordanting basic dyes on bleached pulp
15 Lowering viscosity of coating slips
long fibers, preventing clumping and
ESS
lancol-glue, by retaining more filler and
structural two-sidedness of papers con-
nd/or filler in the furnish.
ed by treatment as in 4b, due to
ing of sheet surface and interior.
evening out formation and sizing, treatment as in 4b
may result in improved printability of hard non-resilient
papers.
PHYSICAL TESTS
Physical test values are frequently sharply increased by
use of Blancol-glue for any of the purposes mentioned
gh foams containing appreciable quantities
nd size can be changed by the addition of
to light fluffy foams readily broken up
rd mills where large amounts of such
t in the vat, the finished sheet shows
bance of formation.

Log-haul and wood room are seen in above view of H. R. MacMillan Export Company Pulp Division's new sulphate mill at Nanaimo, B. C. Photograph at right shows logs being carried up from pond below.



Two speed log-haul drive uses a Pacific-Western DT-62 right angle triple reduction speed reducer (illustrated above) driven at 1200 r.p.m. by a 75 h.p. electric motor. To change drive from low to high speed, operator merely shifts hand lever connected to speed reducer.

LARGE

OR SMALL

Logs are handled easily with a Pacific-Western Two Speed Log-Haul Drive

When H. R. MacMillan Company recently constructed a new, multi-million dollar sulphate mill at Nanaimo, B. C., skilled Pacific-Western application engineers were called in to provide the driving unit for the log-haul. As a result of more than fifty years of service to the paper industry, Pacific-Western developed for this customer the special, two speed log-haul drive illustrated.

This modern log-haul was effectively designed by Pacific-Western to meet mill capacity by moving small logs at high speeds as well as handling large logs at proportionate speeds with the same drive. The need for two different log-hauls and duplicate log transfer machinery has been eliminated. With the Pacific-Western two speed log-haul drive an even flow of logs is maintained from pond to wood room, regardless of size of logs available to mill, and operating costs are substantially reduced.

For log-haul drives or for any other problem in power transmission, take advantage of sound gearmaking experience and call Pacific-Western. Trained specialists are ready to give your requirements careful study to help you cut costs and save valuable man-hours in your mill.

6975

WESTERN GEAR WORKS

Manufacturers of PACIFIC-WESTERN Gear Products

Pacific Gear & Tool Works

Plants at: Seattle, San Francisco, Los Angeles

Representatives: Portland, Denver, Houston, Vancouver, B. C.

AGMA MEMBER

eye-appeal

AND

taste-appeal...

Waxed papers pigmented with* TITANOX *pigment meet today's food packaging requirements

● To a very large degree TITANOX pigments have made possible modern attractive waxed papers. TITANOX pigments not only add real sales-impact but, being inert, do not adversely affect the taste of packaged products.

No matter how you increase the opacity of your waxed papers, there is a TITANOX pigment specially processed to meet your exact need. For instance, very small amounts of TITANOX-A-WD in beater pigmented papers and TITANOX-RCHT for coated stocks boost opacity and visibility appreciably.

Our Technical Service Department is ready at any time to help you with your problems in pigmenting waxed papers. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; 104 South Michigan Avenue, Chicago 3, Ill.; 2600 South Eastern Avenue, Los Angeles 22, Calif. Branches in all other principal cities.

6217

TITANOX

the brightest name in pigments

TITANIUM PIGMENT CORPORATION

Subsidiary of NATIONAL LEAD COMPANY

NEWPORT NEWS
WELDED
LOG
BARKER

Sturdy Construction...

Rugged Performance

The Newport News 45-foot welded log barker is constructed of two slotted drum sections weighing a total of 148,000 pounds. Incorporated in each section, which is fabricated from three 1¼" steel plate rings welded together in halves, are heavy circumferential stiffener rings welded on the outside. Cast steel gears and forged steel rails form part of each assembly. Upon completion of assembly and welding, sections are completely annealed to relieve any stresses resulting from welding.

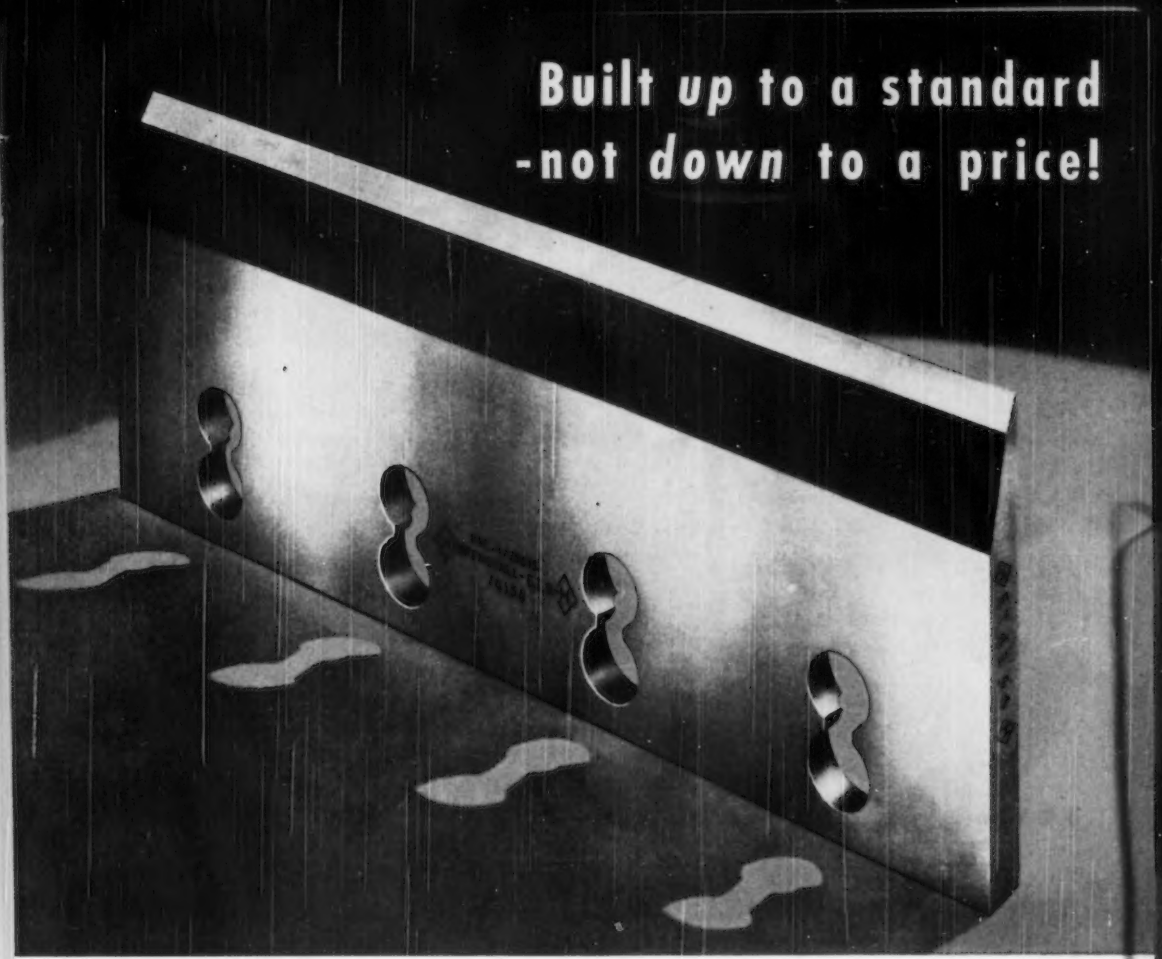
The sturdy construction of the Newport News barker is demonstrated by the rugged performance of two such units which have been in continuous service for almost two years in a large southern mill. Maintenance requirements during the period of operation of these units has been negligible.

Write for additional information.

NEWPORT NEWS

SHIPBUILDING AND DRY DOCK COMPANY

NEWPORT NEWS • VIRGINIA



Heppenstall E. I. S. Chipper Knives

It's the overall *lifetime* cost of your chipper knives—not first cost—that points the way to real economy in chip production. That's why it pays to use Heppenstall E.I.S. Chipper Knives!

To be sure of top quality, Heppenstall makes its own special analysis steels in electric induction furnaces . . . tempers these steels to give you exactly the characteristics you need for a clean-cutting, long-wearing knife.

Because they combine fine steels and correct designs (including standard slot dimensions), Heppenstall solid alloy chipper knives operate more hours between grinds, reduce chipper "down-time", produce fewer oversize chips with less sawdust waste.

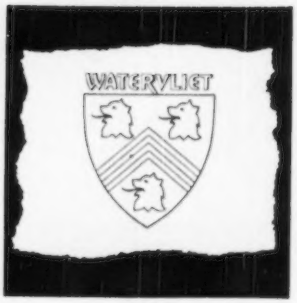
If you're truly economy-minded, order a set of Heppenstall E.I.S. Chipper Knives today and prove their outstanding advantages under your own operating conditions.

Look for the *tan* color on the ends of each knife and shipping box for quick identification.

HEPPENSTALL COMPANY

PITTSBURGH 1, PA.

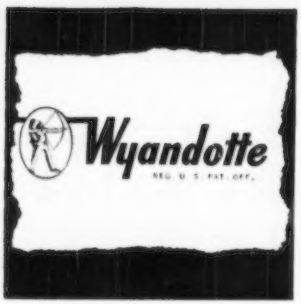
Famous trademarks in paper



This distinctive trademark of the Watervliet Paper Company identifies several well-known brands of uncoated and coated papers.

Thorough testing of the raw materials that go into Watervliet Papers, together with frequent quality tests at every stage of manufacture, assures finished paper products that meet the most exacting specifications.

...and paper making chemicals



Working in close co-operation with many leading paper manufacturers, Wyandotte Chemicals Corporation has developed such specialized products as Wyandotte Precipitated Calcium Carbonate *(Purecal-M®)*, a "tailor-made" paper-coating pigment with several unique advantages.

This truly fine chemical helps provide a superior coated sheet with respect to brightness, opacity, ink absorption, and printing qualities. And it has the characteristics desirable for "on-the-machine" or "off-the-machine" coating. It is uniform in quality and particle size . . . entirely free from grit and other abrasives.

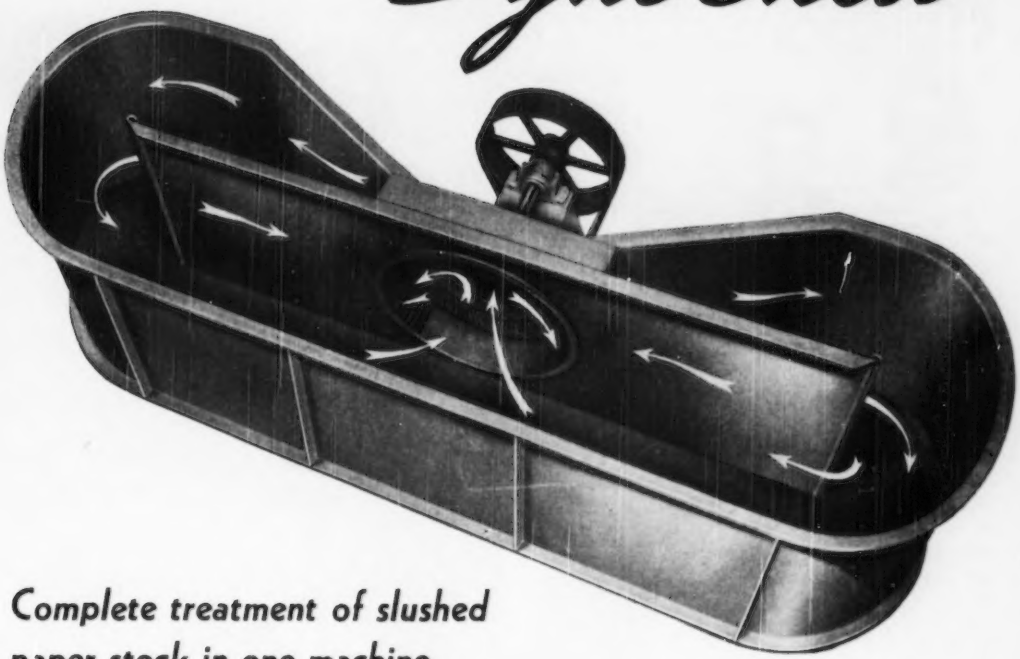
Complete information and technical data on Wyandotte Purecal-M will be sent on request.

®Purecal-M is Wyandotte's new trade name for Precipitated Calcium Carbonate.

Wyandotte Chemicals Corporation
Wyandotte, Michigan • *Offices in Principal Cities*

SODA ASH • CAUSTIC SODA
BICARBONATE OF SODA
CALCIUM CARBONATE • CALCIUM CHLORIDE
CHLORINE • HYDROGEN • DRY ICE
SYNTHETIC DETERGENTS • GLYCOLS
CARBOSE (Sodium CMC) • ETHYLENE DICHLORIDE
PROPYLENE DICHLORIDE
AROMATIC SULFONIC ACID DERIVATIVES
OTHER ORGANIC AND INORGANIC CHEMICALS

The Rice Barton *DynoChest*



Complete treatment of slushed paper stock in one machine

The DynoChest uses the effective dynomizing action to complete the defiberization of the smaller pieces of paper in slush stock and separates the individual fibres one from the other quickly and efficiently. It can be used to excellent advantage ahead of any de-inking system. The DynoChest can be used also as a storage chest while completing defiberization.

The vat can be made for most any capacity from 300 to 3,000 lbs. . . of any selected metal or of tile.

This machine is most economical on horsepower and maintenance as there is only one moving part.

The DynoPeller
is the heart of all DynoMachines. Its concave face is lined with rough, hard carbide particles. As the DynoPeller rotates it causes a suction at its center that pulls the stock towards it. Centrifugal force then causes the stock to flow rapidly over the rough carbide particles. This effective dynomizing action completely disintegrates the stock . . . separating each fibre from its neighbor while maintaining its original length.

Write for complete information.

RICE BARTON *Research Corporation*
WORCESTER 1, MASS.

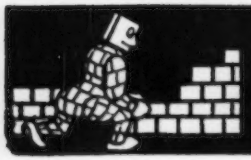
A CONTINENT-WIDE SERVICE

representing 278 years of experience

The thirteen men whose photos and service records appear on this page are well known to pulp and paper mill operators from coast to coast and gulf to gulf as field supervisors for STEBBINS.

Their years of experience in this specialized field of corrosion-resistant linings and tile tank construction assures each mill operator long lasting, trouble-free service from any one of the many STEBBINS' installations, whether it be in the acid plant, digester building, bleach plant, or paper mill.

We are proud of the service records and loyalty of these men and the 92 experienced craftsmen comprising our field organization across the continent. They in turn are proud of STEBBINS' reputation for quality materials and quality workmanship on all of their installations.



SEMCO

Stebbins Engineering and Manufacturing Company

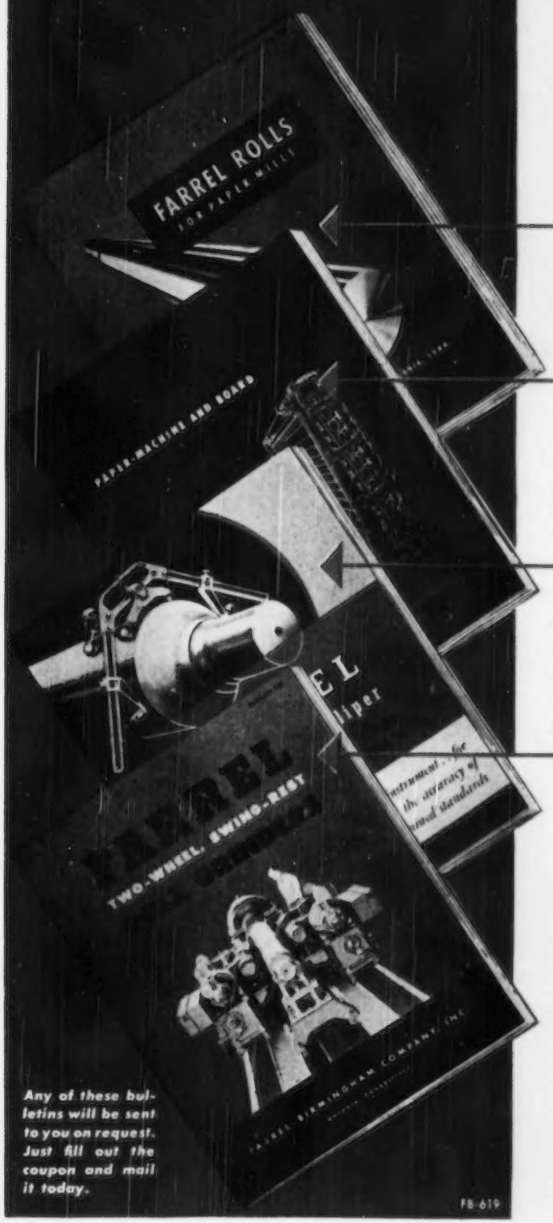
WATERTOWN, NEW YORK

CANADIAN STEBBINS ENG. & MFG. CO., LTD. – CASTLE BLDG., MONTREAL, CANADA

STEBBINS ENGINEERING CORP. – TEXTILE TOWER, SEATTLE, WASH.

SEND FOR ANY OF THESE BULLETINS

On Farrel® Paper Mill Equipment



Any of these bulletins will be sent to you on request. Just fill out the coupon and mail it today.

Almost a century of experience lies behind the design and manufacture of Farrel paper mill equipment. The company was one of the first to make chilled iron rolls in the United States and pioneered in making rolls for paper mills.

Today, the world's largest specialty roll shop is located at the Farrel plant in Ansonia, Connecticut, which also has complete, modern foundry facilities, and machine and erecting shops for producing the following products for paper mills:

ROLLS — Farrel rolls are furnished in sizes from 5" to 72" in diameter and up to 312" face length. They are made of various metals and metal alloys to suit different paper mill requirements. Send for Bulletin 116.

CALENDERS — Farrel paper-machine calenders can be made with rolls in any face length up to 312". Board calenders are also available in a wide range of sizes, designed to suit your requirements. Bulletin 117 describes both types.

ROLL CALIPERS — Farrel roll calipers provide the quickest and most accurate means of checking roll diameter and crown, either when the roll is in or out of the grinder. They are made in five sizes for rolls from 4" to 50" in diameter. Write for Bulletin 112.

ROLL GRINDERS — Farrel two-wheel roll grinders, incorporating the exclusive swing-rest principle and equipped with the Farrel patented crowning device, are available in two sizes for roll diameters up to 32" and 42", any length required. Detailed description contained in Bulletin 118.

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT
Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Akron, Chicago, Los Angeles, Houston

PTJ

FARREL-BIRMINGHAM COMPANY, INC.
Ansonia, Connecticut

Please send me, without cost or obligation, a copy of the bulletin checked below:

....Bulletin 116 "FARREL ROLLS FOR PAPER MILLS"
....Bulletin 117 "FARREL PAPER-MACHINE AND BOARD CALENDERS"
....Bulletin 112 "FARREL INDICATING CALIPER"
....Bulletin 118 "FARREL TWO-WHEEL, SWING-REST ROLL GRINDERS"

Name.....
Company.....
Address.....
City..... State .....

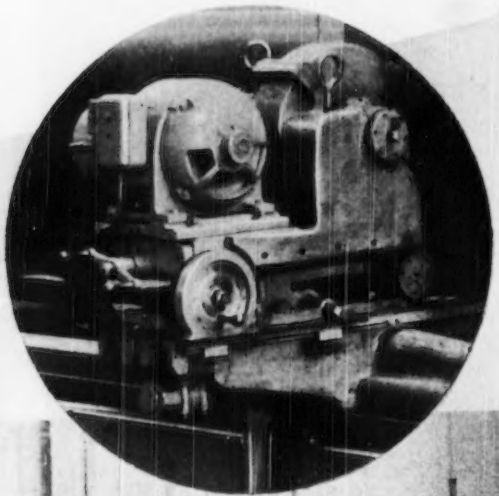
LOBDELL GHV ROLL GRINDER

at BROWN COMPANY

FOREMOST PRODUCERS PURIFIED CELLULOSE

BERLIN-NEW HAMPSHIRE

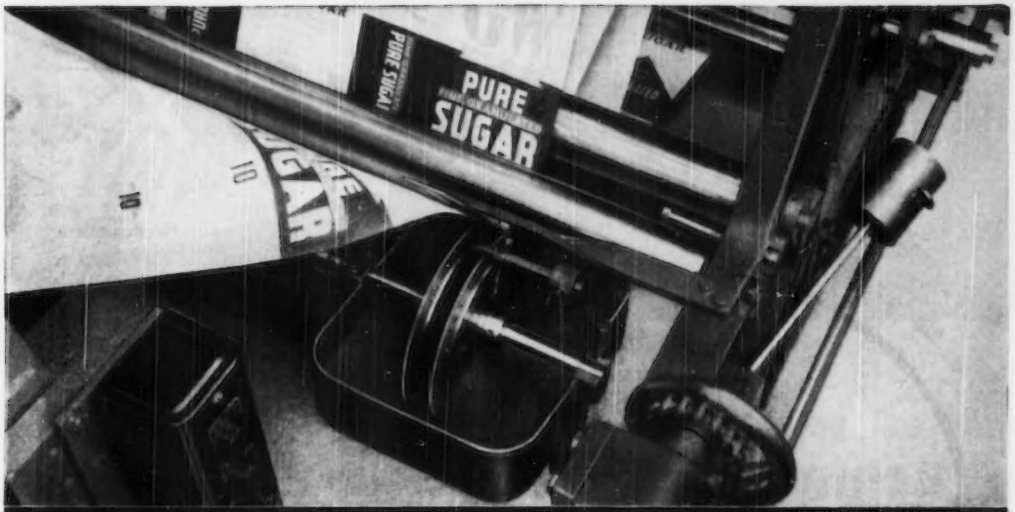
Installed in 1948.
This No. 5 Lobdell Roll Grinder has a capacity which permits rolls 8" to 42" diameter by 222" face to be ground efficiently to the exacting tolerances required by today's paper makers.



LOBDELL UNITED COMPANY

1836 WILMINGTON 99, DELAWARE 1950

A SUBSIDIARY OF UNITED ENGINEERING AND FOUNDRY COMPANY



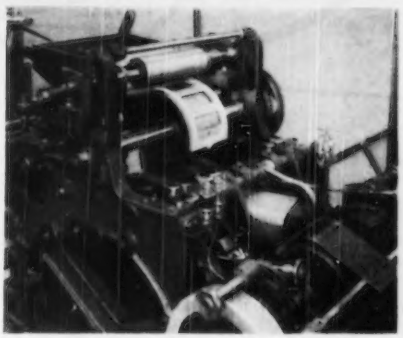
There's a Paisley Scientific Adhesive for Every PAPER BAG Job!

PAISLEY Scientific Research has developed a group of *vastly improved* paper bag adhesives. Now you can get, from this *one, big, dependable source,* a *better* glue, paste or cement for every type of operation in the paper bag plant. Whether you apply by hand or by high speed machine . . regardless of the kind of papers or films to be bonded . . there's a Paisley Scientific Adhesive designed to do each specific job quickly, efficiently, and at lowest cost.

CHECK THIS LIST AGAINST YOUR NEEDS:

1. *Non-hygroscopic glues for salt and sugar bags.*
2. *Water-resistant glues for potato, produce and export shipment bags.*
3. *Seam and bottom pastes for waxed-glassine potato chip and other food bags.*
4. *Flat-laying non-staining glues for moisture-proof cellophane bags.*
5. *Flat-laying* window *adhesives for all kinds of transparent films.*
6. *Flat-laying seam and bottom pastes for bags used in millinery and retail merchandising stores.*
7. *Clean machining resin emulsion adhesives for asphalt-laminated and coated papers.*

Take full advantage of Paisley Scientific Adhesive Developments. Mail the coupon below for our Adhesive Operation Data Sheet. Fill in and return it promptly. Our skilled laboratory staff will study your problem and recommend the ONE best adhesive for the operation. No cost or obligation.



TOP: POTDEVIN self-opening, square, sugar and flour bag machine with double wheel seam paste pot.

BOTTOM: Self-opening, square, POTDEVIN grocery bag machine showing bottom paste sector.

TEAR OUT . . FASTEN TO LETTERHEAD AND MAIL!

Gentlemen: Please send us, at once, your Adhesive Operation Data Sheet. We'll appreciate the assistance of your laboratory staff in making a scientific survey of our paper bag adhesive problems.

FIRM_____ BUYER_____

STREET_____ CITY_____ STATE_____

Paisley SCIENTIFIC ADHESIVE SERVICE

PAISLEY PRODUCTS INCORPORATED

1770 CANALPORT AVENUE, CHICAGO 16, ILL. PHONE CANAL 6-2219
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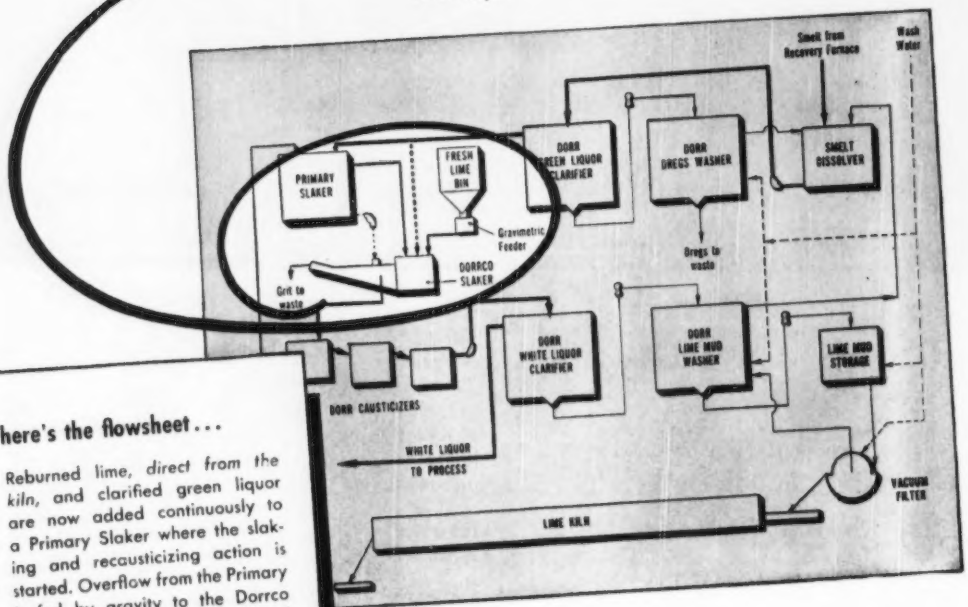
Manufacturers of Glues · Pastes · Resin Adhesives · Cements and related Chemical Products

what's NEW in recausticizing plant practice?

2 stage lime slaking!

The slaking station of the Dorr Continuous Recausticizing System . . . standard of the industry . . . has been redesigned to provide an even higher degree of operating efficiency.



here's the flowsheet . . .

Reburned lime, *direct from the kiln*, and clarified green liquor are now added continuously to a Primary Slaker where the slaking and recausticizing action is started. Overflow from the Primary is fed by gravity to the Dorrco Slaker and a measured amount of makeup lime is added. Slaking is completed in the Dorrco, which produces a clean milk of lime and a washed, separated grit. The remainder of the flowsheet is the standard Dorr System.

here are its advantages . . .

- Troublesome handling of hot lime is reduced to a minimum . . . need for reburned lime bin is eliminated.
- Accurate weighing of makeup lime results in "end point" control with no over or under liming.
- Uniform white liquor strength is maintained regardless of fluctuations in kiln discharge.

If you are interested in alkaline pulping processes, write for a new bulletin #3301 describing the Dorr Continuous Recausticizing System in detail.

DORRCO

THE DORR COMPANY, ENGINEERS
BARRY PLACE, STAMFORD, CONN.

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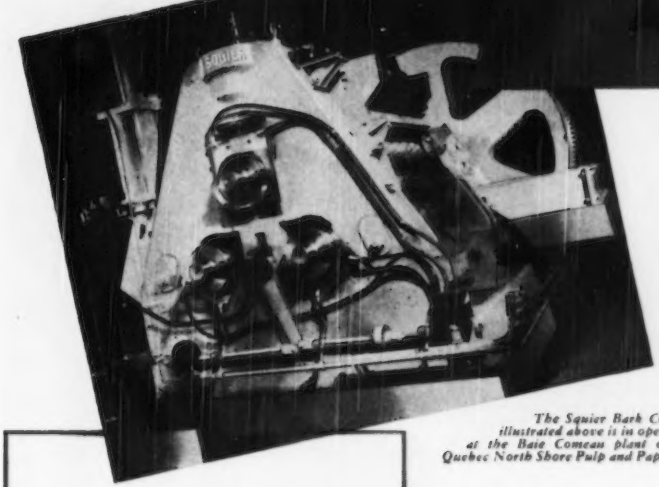
PETREE & DORR DIVISION, STAMFORD, CONN.

ASSOCIATES AND REPRESENTATIVES
Dorr Technical Services and Equipment Are Also Available Through Associated Companies and Representatives in the Principal Cities of the World. Names and Addresses on Request.

DORR

RESEARCH — ENGINEERING — EQUIPMENT

Now YOU CAN



The Squier Bark Crusher illustrated above is in operation at the Baie Comeau plant of the Quebec North Shore Pulp and Paper Co.

by using the new SQUIER HIGH PRESSURE BARK CRUSHER

HERE are some outstanding features of the new Squier Bark Crusher:

1 Extremely rugged design, based on many years of fibre-crushing experience.

2 No hog required, before or after—handles unhogged bark from barking drums.

3 Special Squier-designed feeding device controlled by air pistons readily handles slippery barks.

4 High nip pressures produce drier bark with consequent higher calorific value.

5 Low moisture content of light, fluffy, splayed-out crushed bark particles permits conveying by fan.

6 Disintegration of bark fibres produces a fuel which will burn readily with any type of furnace feeding.

The new Squier Bark Crusher is a heavy-duty machine providing high extraction of moisture and minimum handling of dry-milled bark residue. Milled bark is crushed with fibres well splayed out, for quick drying or burning directly in furnace.

The Squier Bark Crusher operates *dependably*, with least-possible maintenance cost and low relative horsepower requirements.

Write us TODAY for full details.

The SQUIER Corp.

The Geo. L. Squier Mfg. Co.

159 MORTIMER STREET **BUFFALO, N. Y.**

A RESEARCH CORPORATION COTTRELL

will save you $1000 to $1500 worth of salt cake every day

The engineer from Research Corporation spoke confidently. He had studied the equipment layout, and noted that the mill had a capacity of 1,000 tons of pulp per day. From his experience and specialized knowledge he knew that he could safely anticipate a minimum recovery of 100 pounds of salt cake for each ton of pulp produced—total: 50 tons of salt cake per day—value: $1,000.00 to $1,500.00 per day dependent upon salt cake cost prevailing at the plant.

Performance like this is the result of over 35 years of experience combined with careful engineering appraisal, attention to details and a remarkably efficient method. These, plus equipment which gives recoveries of 90 to 99%, are responsible for outstanding records of recovery.

If you are losing your chemicals through the stack in a soda or sulphate mill investigate the Research Corporation Precipitator.

RC-108

Research Corporation Installations

47 CARBON BLACK PLANTS
200 METALLURGICAL INSTALLATIONS
203 ACID PLANTS • 34 PAPER MILLS
262 DETARRING INSTALLATIONS
195 POWER STATIONS
71 STEEL PLANTS • 95 OIL REFINERIES
AND MISCELLANEOUS INSTALLATIONS

RESEARCH CORPORATION

405 Lexington Avenue, New York 17, N. Y.
122 South Michigan Avenue, Chicago 3, Illinois

MORE EYE APPEAL
. . . in colorful kraft envelopes

There *is* an important difference in kraft envelopes . . . and that difference is color. Some are drab, lifeless, washed-out. Others have a sprightly, pert yellow-tan tone that gives them eye appeal . . . and sales appeal.

Some excellent, economical dyes, suitable for kraft papers, are listed here. Others are available. Our Technical Staff will be glad to help you with this . . . or *any* of your color problems. Write: E. I. du Pont de Nemours & Co. (Inc.), Dyestuffs Div., Wilmington 98, Del.

FOR MAXIMUM ECONOMY

Du Pont Basic Dyes
- Du Pont Auramine Conc.
- Du Pont Chrysoidine GN

FOR GOOD LIGHT FASTNESS

Du Pont direct dyes
- Du Pont Brilliant Paper Yellow Extra Conc. 125%
- Pontamine* Yellow SXP Conc.
- Pontamine* Yellow S3G
- Du Pont Stilbene Yellow G Conc.
- Du Pont Stilbene Yellow GCB Conc.
- Pontamine* Yellow CH Conc.

*Reg. U. S. Pat. Off.

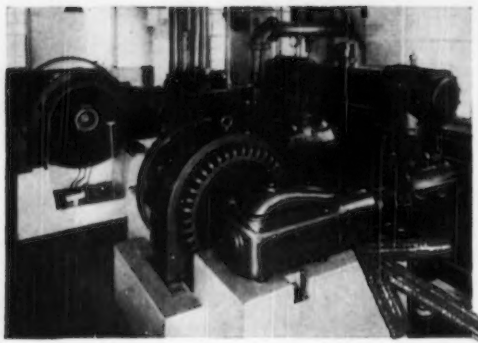
More color makes more business . . . for your customers and you

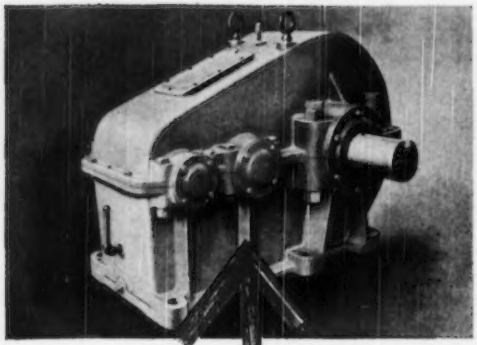
Du Pont Dyestuffs

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*





For the best lubrication use SINCLAIR RUBILENE

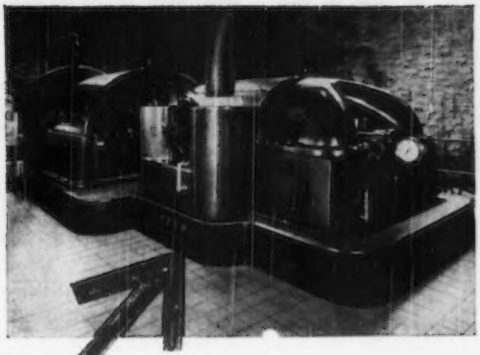
Over many years engineers in power plants throughout the country have accepted Sinclair's Rubilene as the finest available lubricant for power house equipment.

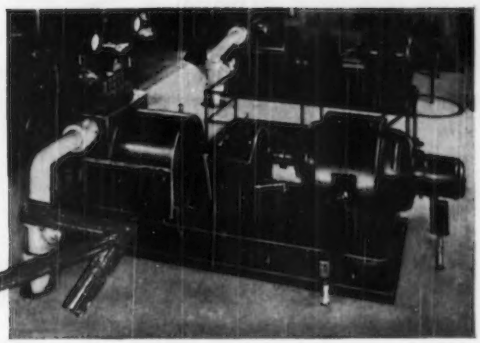
Sinclair Rubilene has always been a top-quality oil, as it has been constantly improved through the years, incorporating the latest technological developments in refining and processing. It resists oxidation under continuous high temperatures, and recirculation. It separates rapidly from water and is non-foaming. Through long periods of use it retains its original qualities, providing uniform, trouble-free lubrication and low maintenance costs.

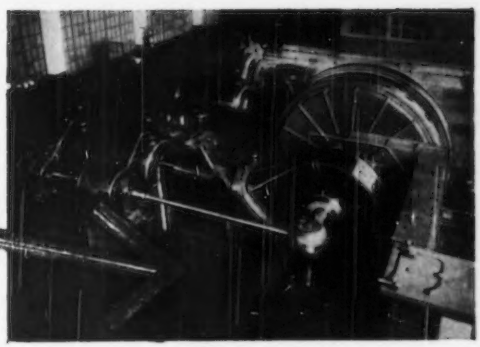
Yes...Rubilene's finer quality pays dividends in the power plant.

SINCLAIR

For lubrication counsel . . . see your nearest







REFINING COMPANY

Supplier of Sinclair Products or write to Sinclair Refining Company, 630 Fifth Ave., New York 20, N. Y.

For Clean, Accurate Cutting

—*The* BAGLEY & SEWALL CUTTER

TWO VIEWS OF THE CUTTER

This Bagley and Sewall Cutter is rigidly constructed with heavy box section framework for smooth operation, clean and accurate cutting. It has many new and desirable features.

For example, the drives on the knives and draw rolls of this Cutter are positive — no belts — assuring accurate sheet lengths.

The knives are easily adjusted — no shims required.

When the knife assembly is swung to square up the sheets, it pivots around a vertical gear shaft so the gears are always in mesh.

It isn't necessary to break down the sheet to change from one pair of slitters to another.

And all clutches are operated from the front side of the machine.

We can supply these Cutters in Simplex, Duplex, or Triplex designs. Write us for complete information.

BAGLEY & SEWALL

DESIGNERS AND BUILDERS OF PAPER MAKING MACHINERY

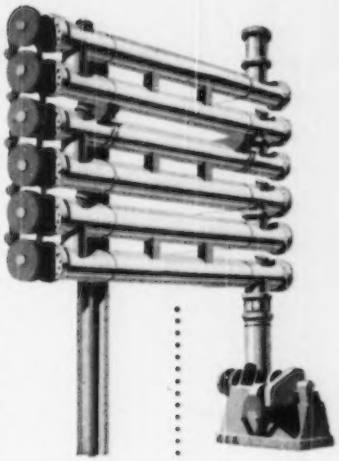
WATERTOWN, NEW YORK

Finland Representative
Aktiebolaget Ekstroms Maskinaffar
Helsingfors, Finland

NEW YORK OFFICE: 500 Fifth Avenue, New York, N. Y.

Foreign Representative
Castle and Overton, Inc.
630 Fifth Ave., Rockefeller Center, New York, N.

How Continuous Cooking and Pulping Equipment Cuts Costs



PROJECT: *To replace batch pulp cooking economically and gain advantages of continuous cooking in mono-sulphite or alkali-treating mediums for production of free fibre in a southern paper mill.*

EQUIPMENT: *Modern pulpmaker for continuous cooking and pulping. A Chemipulper, with three-unit reaction chamber having sturdy rigid tubes of acid- or alkali-resisting Lukens Stainless-Clad Steel and stainless steel continuous-feed screw conveyors.*

END RESULT: *Easy control of time, pressure and temperature with measured continuous chip and chemical feed. Greater volume with less manpower. More uniform pulp from hard or soft woods. No corrosion. Low operating and maintenance costs. Longer equipment life.*

These benefits are typical of results achieved with newly developed, more efficient pulp and paper equipment. And wherever design, fabrication and materials selection must be critically coordinated, you will find the economical answer in applied *Lukenomics*. Lukenomics combines the experience of designers, engineers and equipment builders with Lukens' knowledge of materials and their application gained over 140 years as the world's leading produce of specialty steel plates, heads and steel plate shapes.

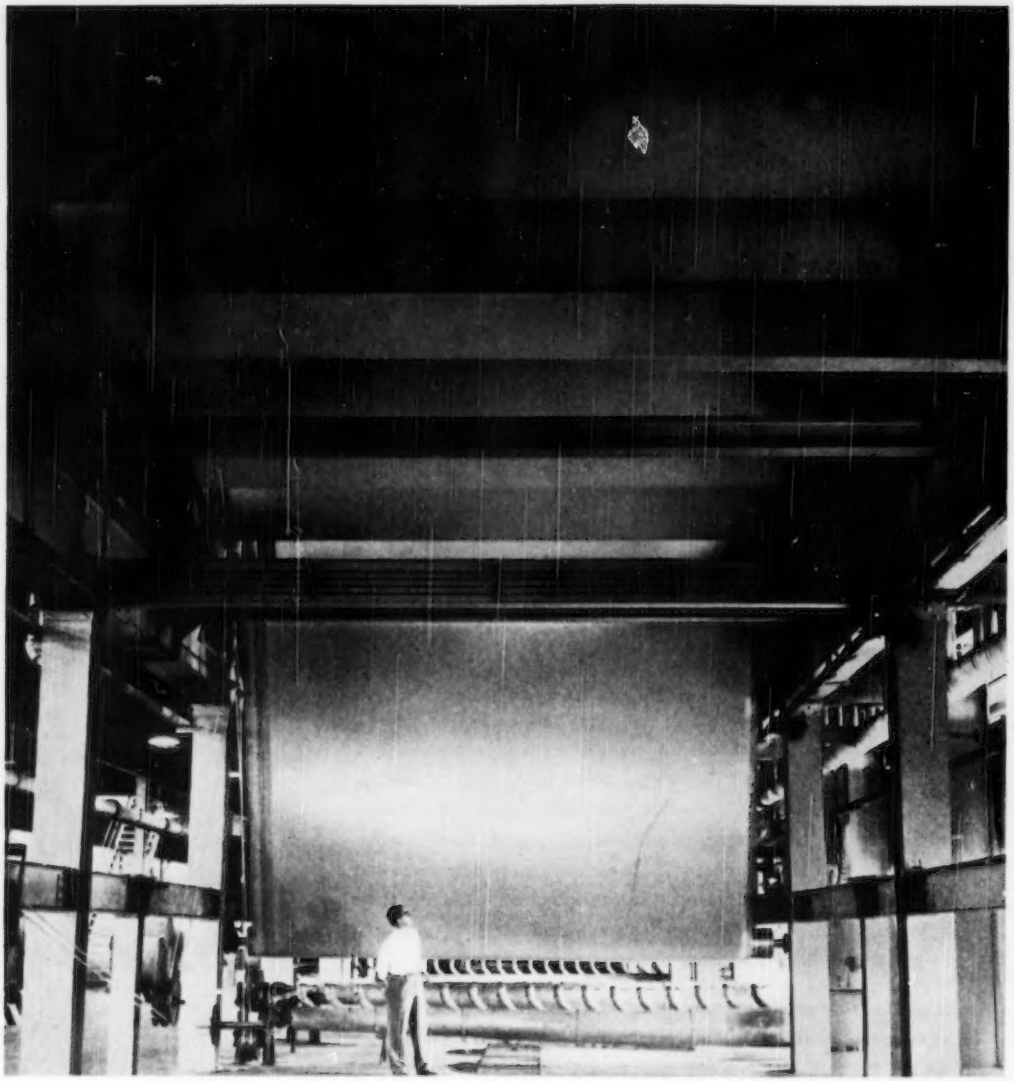
It's sound investment insurance to put Lukenomics to work on your equipment problems. There are progressive fabricators who can do this for you. Get in touch with them or write our Manager of Marketing Service, stating your problem. There's a Lukenomics team ready to go to work on it. Lukens Steel Company, 403 Lukens Building, Coatesville, Pa.

The unit illustrated was fabricated by Alloy Fabricators for Paper and Industrial Appliances, Inc., distributors of the Chemipulper. The reaction chamber tubes are made of 20% Lukens Stainless-Clad Steel, Type 304.

LUKENS

LUKENS STEEL COMPANY

BETTER PRODUCTS FOR BETTER EQUIPMENT



Photo—Courtesy of Macon Kraft Company

Paper Mill Superintendent Carl J. Plumlee views an ASTEN Dryer Felt on Macon Kraft Company's renowned 216" board machine, affectionately called "The Buccaneer."

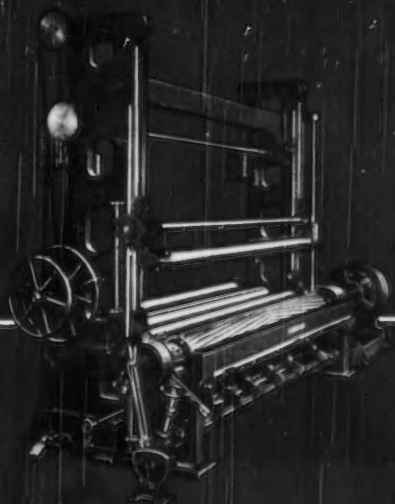
ASTEN-HILL MFG. CO.
PHILADELPHIA, PENNA.

ASTEN-HILL, LTD.
VALLEYFIELD, QUE.

how long is a CH'IH?

This Chinese "foot" varies from 12 to 15⅓ inches depending on the locality. So one of a Langston Slitter and Roll Winder will cover "Upon request" an almost infinite field of speedy production of first-quality rolls.

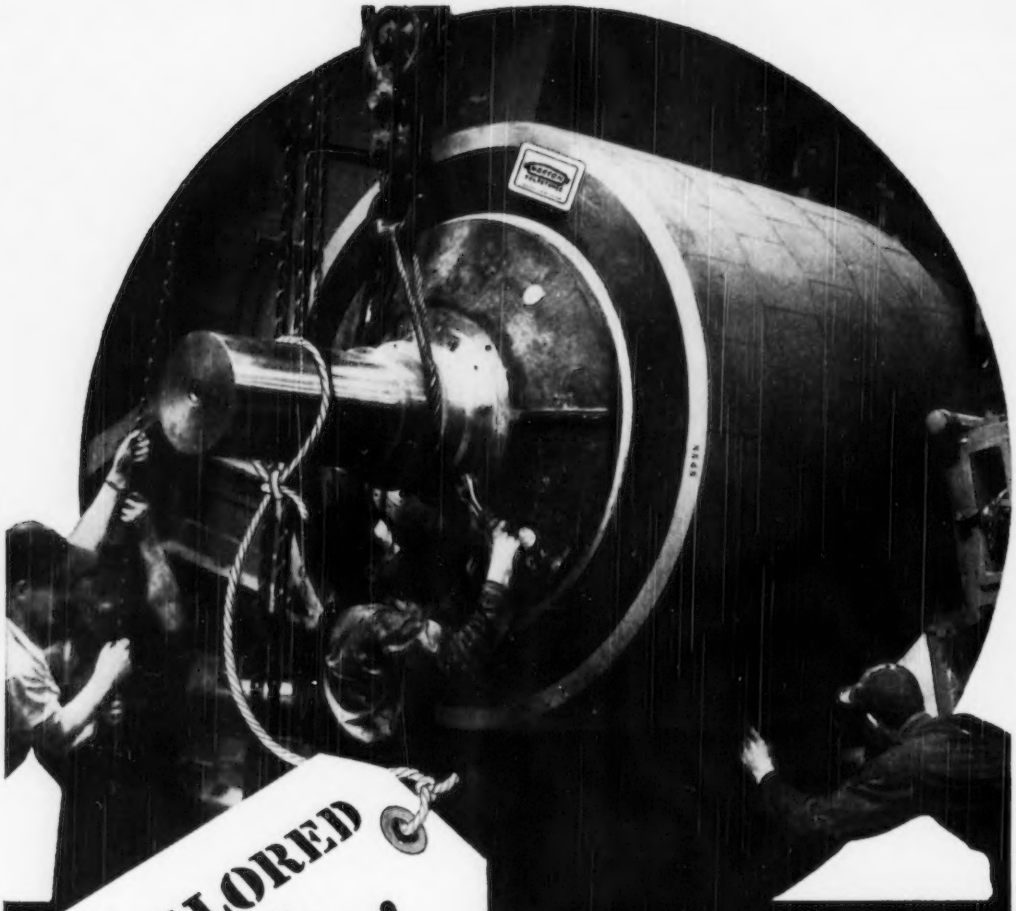
Samuel M. Langston Company, Camden, N. J.



SLITTERS

Langston

ROLL WINDERS



TAILORED TO ORDER!

THAT'S what you get when you install a Norton Pulpstone—a stone tailored to produce just the right kind of pulp to meet your particular requirements.

First the size and end shape are made right to fit the specific grinder for which you have ordered it (diameters range from 40" to 72", widths from 19" to 66"). Then the kind of abrasive and its grit size, the grade (hardness) of the stone and its structures (grain spacing) are selected to produce your kind of pulp from your kind of wood.

Yes, you get minimum pulp costs when you get a Norton "Tailored-to-Order" Pulpstone.

NORTON COMPANY, WORCESTER, MASS.
Norton Company of Canada, Ltd., Hamilton, Ont.

NORTON
PULPSTONES

MATERIALS HANDLING IN THE PAPER INDUSTRY

Many paper mills and paper products plants are enjoying numerous advantages possible with Cleveland Tramrail. They are speeding production and lowering costs by eliminating rehandling. They are reducing floor congestion and removing hindrances and confusion. They are aiding safety. They are using overhead space to save floor space. They are reducing spoilage and greatly increasing warehouse capacity by eliminating need of aisles and piling higher.

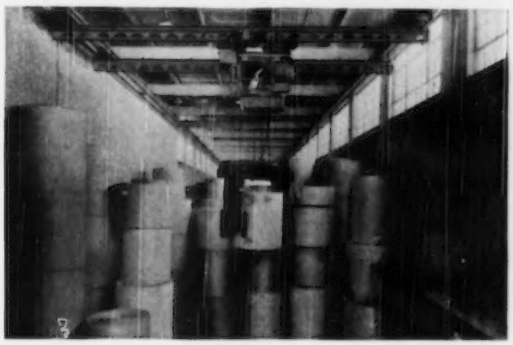
A Cleveland Tramrail cab-operated crane with motor-driven screw grab serves this 8000-ton pulp storage. The grab picks up three bales at a time without operator leaving cab.

STANDARD ITEMS EASILY COMBINED TO HANDLE MATERIALS OF ANY KIND

Cleveland Tramrail raised-tread long-wear rail.

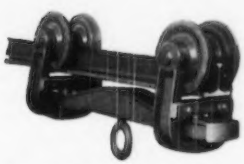
Cleveland Tramrail consists of standard items such as rail, switches, carriers, cranes, hoists, grabs, etc., which can be combined in a thousand-fold ways to serve nearly every materials handling requirement.

Cleveland Tramrail Archbeam in seven sizes for various loads and conditions.



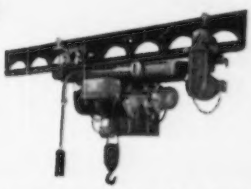
This Cleveland Tramrail crane with motorized roll grab picks up rolls weighing as much as 6000 lbs., sets them down or turns them from vertical to horizontal position.

30,000 INSTALLATIONS



Hand propelled carrier built for long life and easy operation. Wheels have hardened tread and flange; bearings are double race type.

Backed by experience with 30,000 installations in industries of all types, Cleveland Tramrail representatives are in exceptionally good position to serve you. They will gladly advise, survey your plant, make layout or prepare quotation without obligation.



Motor-driven carrier with electric hoist. One of many types built by Cleveland Tramrail.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
7011 EAST 287th STREET • WICKLIFFE, OHIO

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

IF YOU SHIP PAPER IN ROLLS

CUT FINISHING ROOM COSTS *and* PRODUCE NEATER ROLLS

Murco ROLL HEADING MACHINE

THE ORIGINAL
ROLL HEADING MACHINE
Backed by Over 25 years Successful Experience

★ OPERATE LEVER

FOR VALVE MECHANISM FROM ANY POSITION . . . OPERATOR DOESN'T HAVE TO RUN BACK AND FORTH TO OPERATE IT.

★ ALUMINUM ROLLERS

DO AWAY WITH MAINTENANCE . . . NO WARPING, DISTORTING OR CRACKING . . . NOR GET OUT OF LINE.

★ HEAVY FRAME

PLATENS APPLY PRESSURES EVENLY TO THE ENDS OF THE ROLL . . . NO SPRINGING OR TWISTING OF FRAME.

Murray is the pioneer roll heading machine in the industry. . . Into the design and manufacture of Murco Roll Heading Machines are over 25 years experience and the "know-how" of building a machine that will stand up, free from trouble and maintenance—a machine that will operate efficiently and continuously day-in-and-day-out without any attention that is so common with machines of lighter construction. The many paper mills now using Murco Roll Heading Machines prove they are right—and your guarantee that they will perform efficiently in your mill.

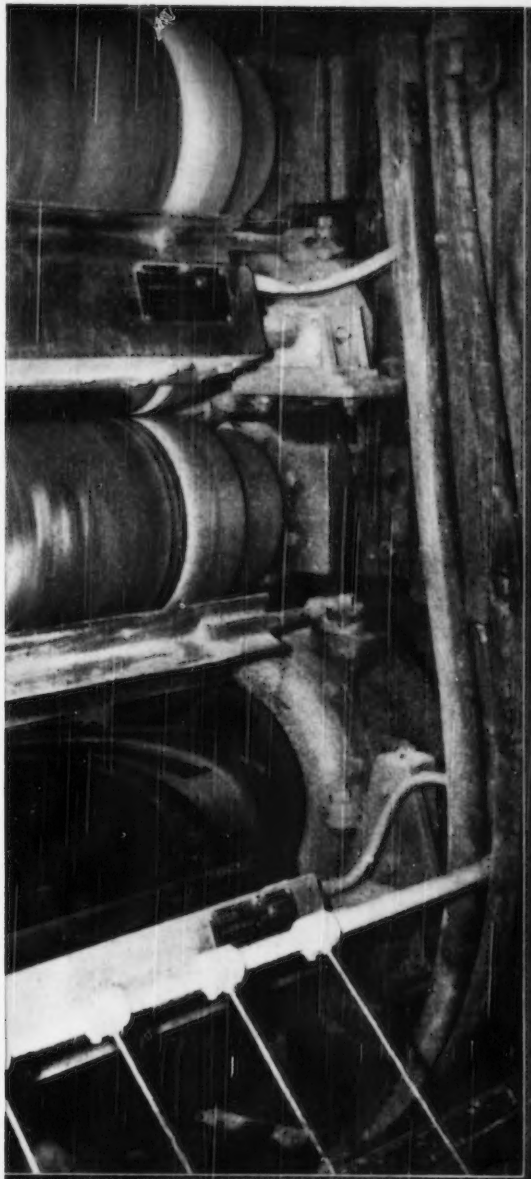
Standard Platens are not heated but platens can be furnished heated either by steam or electricity.

Murco Roll Heading Machines are made in various sizes 24" to 50" diameter and lengths varying up to 200".

Write Tell us the size of your rolls and present methods of heading rolls and we will submit a proposal to best meet your requirements.

D. J. MURRAY MANUFACTURING CO. WAUSAU WISCONSIN

MANUFACTURERS SINCE 1883



DOCTORS

completely engineered

by LODDING

are essential

for today's

high-speed

production

Lodding Engineering Corporation, Worcester, Mass.
Represented by W. E. Greene Corporation,
Woolworth Building, New York

PACIFIC-NORTHWEST — another in a series of scenes . . . areas where Appleton Wires serve the paper industry.

THE PACIFIC-NORTHWEST . . . a backdrop of primitive grandeur brought alive by the power-giving Columbia cascading out to the blue Pacific. Here, too, midst a mingling of backwoods and metropolis, fighting fish, canneries, lumber mills and freshly irrigated agricultural wealth, you'll find the paper industry. And, practically all of these mills already know that *Appleton Wires are Good Wires!*

APPLETON WIRE WORKS, INC., APPLETON, WISCONSIN

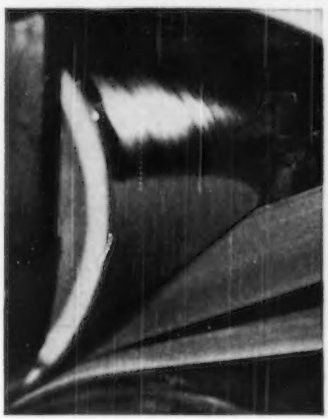
© APPLETON WIRE WORKS, 1950

Efficient water removal means:

Longer Felt Life
Less Down-Time
Increased Production
Greater Profits

In one mill after another, Downingtown Suction Press Rolls have proved that vertical water removal pays off in longer felt life, less down-time, and higher machine speeds. Plain press rolls extract the water horizontally, forcing it back through the web of paper and the felt, against the direction of the run. This disturbs the formation, and tends to fill up the felt. Mill data show clearly the advantages of the suction method.

For example, before a recent installation on a Harper-type Fourdrinier, the top speed on 12-13 lb. napkin stock was 450 FPM, because crushing and pin holes developed at the press when this speed was exceeded. A 22-inch rubber-covered Downingtown Suction Press Roll permitted operation at 700 FPM, and gave a 90% increase in felt life. No other changes or additions were made to the machine. Forming and drying capacities limited the speed to 700 FPM—not press capacity.



Efficient vertical water removal shown by absence of water at incoming side of press

In another mill that is producing facial, a Downingtown Suction Roll allowed a speed increase from 700 to 1200 FPM. Again press was not the limiting factor. Prior to the installation, felts had to be washed three times each 24 hours. Felt life average was seven days. Since installation, no washing of felts during runs is required, and felts now average 16 days, a life increase of well over 100%, at an increase of 70% in speed.

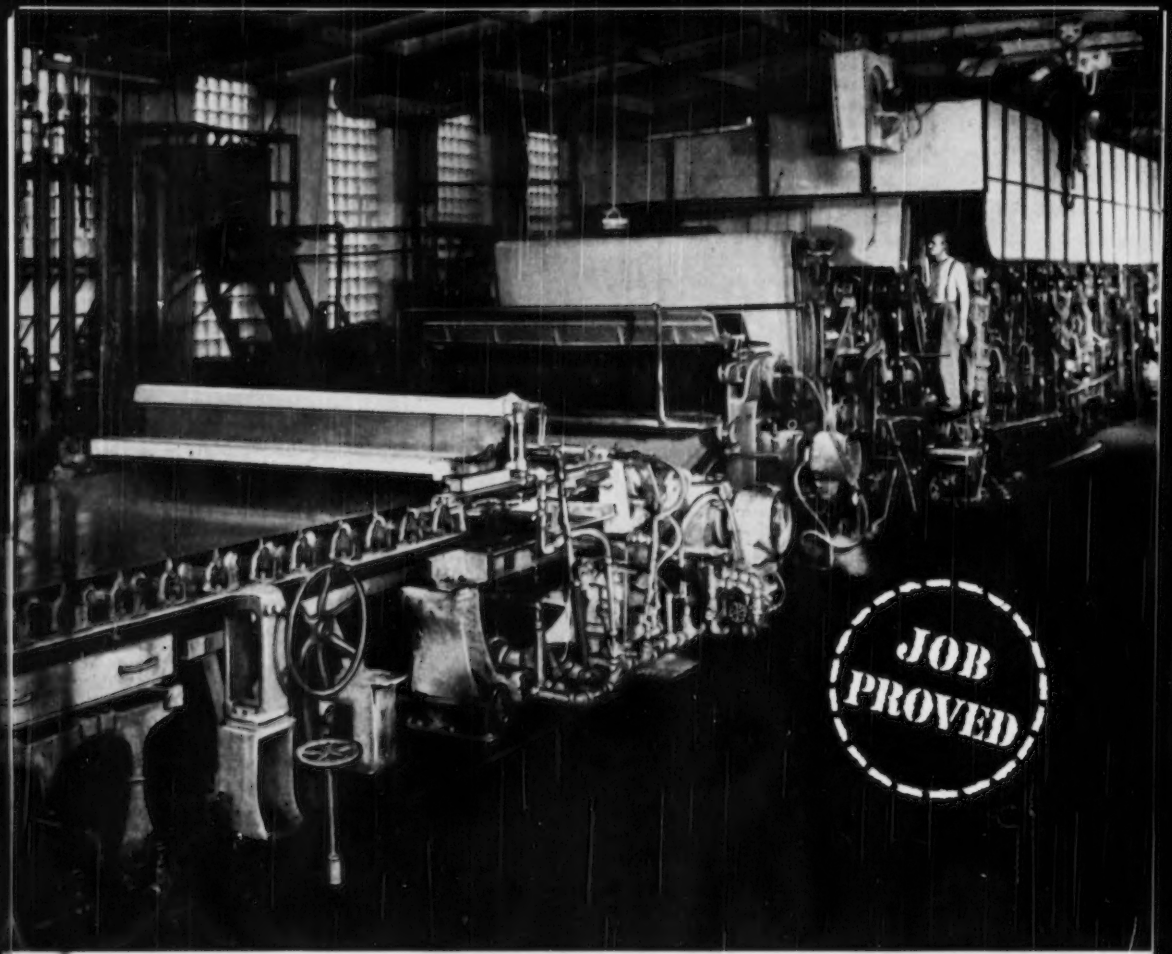
These are not exceptional cases, but are exactly the kind of results you can expect in your mill. We'd like to tell you more about Downingtown Suction Press Rolls and the rest of our complete line of suction equipment. Write us.

DOWNINGTOWN MANUFACTURING COMPANY

DOWNINGTOWN, PA.

Pacific Coast Representative: JOHN V. ROSLUND, Pacific Bldg., Portland 4, Ore.

DESIGNERS AND BUILDERS OF PAPER AND BOARD MAKING MACHINERY SINCE 1880



10 YEARS WITHOUT A BEARING FAILURE

Circo XX Heavy Gives Paper Maker Maximum Protection Against Production Delays

The Fourdrinier shown above is one of six which turn out 180,000 feet of fine offset and specialty paper every hour. In order to achieve this output, the machines are kept in constant operation. To make absolutely certain that nothing slows production down, the company takes every possible precaution against bearing failure.

The drier roll bearings on all six Fourdriniers have been lubricated by "Job Proved" Circo XX Heavy Oil for the past ten years. In this length of time there has never been a bearing failure because of inadequate lubrication. Because of the low carbon residue of Circo XX Heavy, bearings are cleaned only when the machines are torn down for routine inspection.

This is one case history among many which show the advantages of using Sun "Job Proved" Products. To help you solve your production problems, Sun Oil Company offers you a wide selection of "Job Proved" petroleum products, plus the experience of Sun representatives. Their know-how and detailed product information are yours for the asking. Just call or write your nearest Sun Office.

SUN OIL COMPANY • *Philadelphia 3, Pa.*
In Canada: Sun Oil Company, Ltd.
Toronto and Montreal

SUN PETROLEUM PRODUCTS
"JOB PROVED" IN EVERY INDUSTRY

SUNOCO®

Paper TRADE JOURNAL

TRENDS

Office of the PAPER TRADE JOURNAL,
Wednesday, September 6, 1950.

Domestic Pulps In Moderate Rise

Settlement of the nine-day old Canadian rail strike on August 31 brought some relief to U. S. pulp consumers. Though still hampered by the acute shortage of box-cars in Canada and the U. S., shipments are rolling again. (Accelerated movement of military supplies is likely to aggravate this condition, informed sources state.)

But there is the apprehension about fourth-quarter pulp prices, like a settled gloom over September. What happens to these prices must be the bent of selling prices for the finished product. And to mills which must compete in the market with the product of integrated mills, costs of wood pulp are a major determinant of ultimate survival.

A lift in the ceiling was made by the September 1 announcement from a West Coast mill that bleached sulfite will take a rise of $7 a ton, moving from $123 to $130, delivered basis. The moderate lift to cover increased costs of labor, chemicals and other raw materials, is seen as a major contribution to the stability of U. S. and Canadian markets. Other domestic and Canadian quotation of the same date show the same tendency to stabilize. Bleached sulfite is quoted at $135, a rise of $10; unbleached sulfite, $117, likewise a rise of $10; bleached southern kraft, $140; unbleached northern kraft, $110, a rise of $15; bleached soda, $130, up $10; semi-bleached soda, $122; groundwood pulp, $75, up $5, all on a delivered basis.

Early Swedish Prices Rocket

To press time, only one Scandinavian mill had been heard from, the quotations covering a $35 per ton rise on bleached grades of kraft and sulfite. Bleached kraft is quoted at $165, bleached sulfite at $160, on dock.

July Production Statistics

The hectic market of July is reflected in APPA statistics, recently released. Production of paper and board for the month is estimated at 1,846,000 tons, 37.1 percent greater than in July, 1949. (See *Table 1.*) Daily average for the month was only 5 percent below the high daily average level of June which, in turn, was one of the three record months with production of over 2 million tons, the APPA points out.

The buying wave which was precipitated by the Korean incident almost counteracted the normal seasonal drop in production and built up the largest backlog of orders on record, by tonnage. (Taken as a percentage of capacity, the backlog is 25 percentage points below the September 1941 backlog. The great increase in capacity in the intervening years makes the current backlog about equal to that of September, 1947, percentagewise.)

July Paper Production

	Production Tons	Percent Changes in Daily Average Production: July 1950* Compared with June 1950	Percent Changes in Daily Average Production: July 1950 Compared with July 1949
A. Printing Papers	243,000	— 7.4	+ 20.0
B. Fine Papers	90,000	— 9.2	+ 35.3
C. Coarse Papers	281,000	— 1.5	+ 50.4
D. Tissue Papers	100,000	— 3.8	+ 19.9
E. Miscellaneous Papers	34,000	— 3.5	+ 57.9
F. Total, Groups A to E	748,000	— 4.8	+ 33.4

Source: APPA.

* July 1950 had one less working day than June 1950 and the same number as July 1949. Annual vacations are involved in these losses.

Materials

Casein.— Domestic supply very limited. Prices nominal. Offerings from Europe and Argentine also limited. No easing of supply possible until new Argentine season gets underway. Devaluation of peso has added further confusion to Argentine market. Expected easing of price is seen as temporary in view of tight supply and world demand. Prices largely nominal.

Chlorine.— Strikes exerting tremendous influence on production of pulp mills in particular. Supply acutely short.

Caustic Soda.— Producers reported to be making partial shipments to regular contract accounts. Plants still strike-bound.

Soda Ash.— Government intervention asked to settle strikes. Supply in all industries now dangerously low.

WASHINGTON. — Caustic soda and soda ash have been placed again under export control for all destinations outside of the Western Hemisphere, effective September 1, Commerce Department reported last week. Validated licenses will be required for all shipments outside of this hemisphere, for the first time since late in 1948.

In view of this re-control of soda ash and caustic soda exports, new interest attaches to scattered reports of output of these chemicals in various areas affected by the order.

Continued favorable supply of hydroelectric power in Germany led to production in April, the latest figure reported, of 5,011 tons of caustic soda, compared with 4,517 in March. In the first quarter of the year, Austria was producing 5,597 tons of caustic soda and 24,975 tons of soda ash, against 19,468 and 93,263 tons respectively in the comparable months of 1949. From Pakistan it is reported that a 10-ton plant for caustic soda production is to be established. On the other hand, Brazil, which as a Western Hemisphere country can continue to receive supplies, reported an increase of 1,030 tons in first quarter, 1950 imports, totaling 16,250 metric tons, over imports in the same quarter a year earlier.

Rosin.— CCC advanced September rosin prices 35 cents over August level as orders poured in and stocks receded. A sustained demand is shown for the product in world markets with government-owned stocks moving into domestic and foreign markets on about a 50-50 basis. CCC gum rosin inventories show a total of about 660,000 drums. Reports through August 28 showed 92,000 drums of gum rosin have been sold by the CCC this year — all but 6,000 since July 13 when the effects of the rearmament program began to be felt. Movement of rosin on the "free dollar" basis shows a surprising volume of sales as compared to those of ECA, a type of buying in American dollars almost non-existent for several years, it is reported. Currently quoted on Savannah market in George to Nancy grades at $6.50.

WASHINGTON — The outlook for Swedish naval stores exports is reported improved, partly as a result of free-listing of a number of such products for import by Western Germany, Switzerland, Belgium and the Netherlands, according to a report received here. Swedish exports of solid rosin were more or less dormant in the post-war period until 1949, it is recalled, when 300 tons were shipped, probably the largest Swedish rosin export total of record. However, said the information, as a measure to insure adequate domestic supplies for various purposes, Swedish authorities were restricting exports of liquid rosin to 10 percent of a producer's total output, and to 20 percent in the case of tall oil.

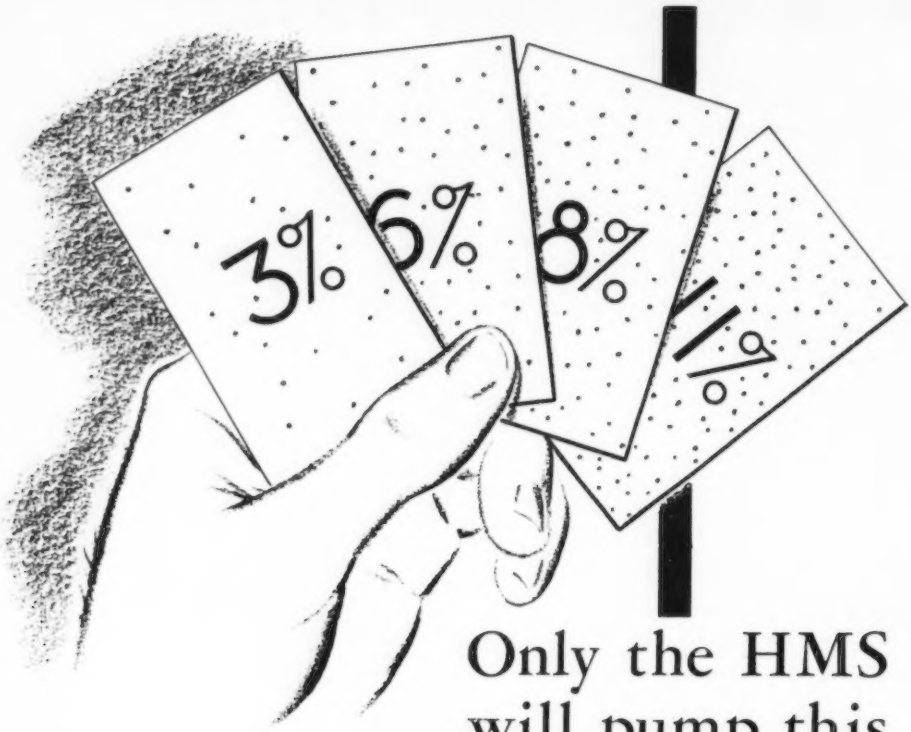
WASHINGTON — Wood rosin, naval stores and related products featured ECA authorizations for eight European countries this week.

Among procurement authorizations to be filled in this country were: United Kingdom, wood rosin, $200,000; pinene, pine tar, dipentine, tall oil, balsam, pine oil, and sulphate turpentine, $60,000; Austria, wood rosin, $5,000; Iceland, naval stores, $5,000.

Paperboard Production (Tons)*

	Aug. 26 1950	Aug. 19 1950	Aug. 27 1949
Production	228,119	229,349	184,603
New Orders	211,075	265,358	173,980
Unfilled Orders	645,496	679,065	294,327

*Source: NPA.



Only the HMS will pump this

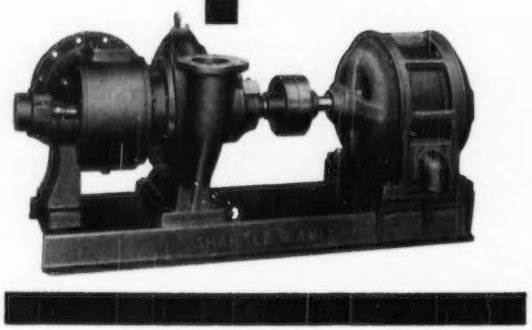
Looking for an extra high density pump? If so, you're reading the right ad.

We've spread eagled four cards and, with dots, indicated the fiber in stock of various consistencies.

1. Any pump will handle stock up to 3%.
2. Most pumps will handle stock up to 6%.
3. A few pumps will handle stock up to 8%.
4. Only the HMS will handle stock up to 11%.

The HMS can and is doing a 11% consistency pumping job where required and an HMS would do as much for you.

Also water and white water designs and the good old reliable plungers for mills that still use them.

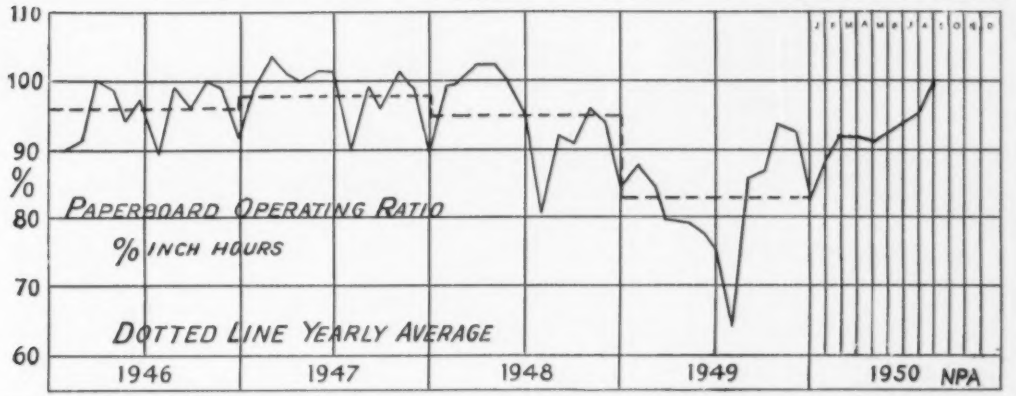


Shartle Bros. Machine Co.

MIDDLETOWN, OHIO

DILTS MACHINE WORKS, Fulton, New York
Divisions of THE BLACK-CLAWSON COMPANY, Hamilton, Ohio
Western Sales Office: Mayer Bldg., Portland, Oregon
Associate: ALEXANDER FLECK LIMITED, Ottawa, Canada
Subsidiary: B-C INTERNATIONAL, LTD., 16 Catherine Place, Victoria, London S. W. 1, England

OUR BUSINESS



Source	Production	WEEK ENDING Aug. 26, '50	July 29, '50	Aug. 27, '49
APPA	Paper Production percent 6-day Capacity	107.6	106.1	90.3
	Unbl. Kraft Paper Production percent	96.8	96.7	76.0
NPA	Paperboard Operating Ratio percent inch hours	100.0	96.0	86.0
		July 1950	**June 1950**	**July 1949**
APPA	Paper Production* (Except Newsprint and Building Papers) ...Tons	748,000	788,500	555,000
	New Orders ...Tons	957,000	812,800	589,000
	Unfilled Orders ...Tons	775,090	565,565	368,365
	Shipments ...Tons	745,000	786,300	566,000
		July 1950	**June 1950**	**July 1949**
NPA	Paperboard Production ...Tons	745,255	846,030	583,800
	New Orders ...Tons	890,890	855,016	618,100
	Unfilled Orders ...Tons	524,391	394,110	268,500
	Our Customers Activities Index[1]	**Latest Mo.°**	**Previous Mo.°**	**Year Ago***
FRS	Manufactures Total Index	209	203	176
	Durable Mfg. Index	238	232	195
	Nondurable Mfg. Index	184	180	161
	Chemical Products Index	259	255	230
	Mfg. Food Products Index	164	157	165
	Printing and Publishing Index	169	169	148
ODC	Magazine Advg.-Printer's Ink Index	321	324	314
	Retail Sales Combined Adjusted Index	316.2	313.0	300.9
	Drug Index	215.4	215.9	225.3
	General Merchandise Group Index	306.6	300.5	293.1
	Grocery and Combination Index	379.2	379.1	358.1
	Prices Index			
BLS	Consumers Price Index[1]	170.2	168.6	169.6
	Wholesale all Commodities[2]	157.3	155.9	154.5
	Wholesale Foods[2]	162.1	159.9	162.4
	Commodities other than Farm Products and Foods[2]	148.8	147.6	145.5
	Wholesale Pulp and Paper[2]	155.4	155.4	159.6
	Purchasing Power of Dollar, Consumers Prices[1]	58.8	59.3	59.0
	General Activity Index			
FRS	Mfg. Production-Worker Payroll	349.0	337.2	312.8
	Unemployment Compensation Initial Claims (M)	1,104	1,367	1,522
	Miscellaneous Carloadings–Thousands of Cars	1,846	1,424	1,637
	Electric Output (Million KW hr.)	31,608	31,486	28,025
PTJ	Average 32 P & P Common Stocks as of August 29	$32.35	$29.96	$26.20
	Average Indicated Dividends Common Stocks as of August 29	$ 2.32	$ 2.32	$ 2.23

[1] 1935-39=100 Unadjusted Index
[2] 1926=100
* For details see APPA Monthly Statistical Summary—June 1950 Estimated Figures
° Latest Month Available on Request

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Less belt damage, less "spill" with B. F. Goodrich cord belts

THIS B.F.Goodrich oilproof beltroad handles washed and sized coal from plant to river barges on a retractable conveyor system. Cord belts keep centered on idlers, require less maintenance because cords are free to flex. No spillage; troughs better even when running empty. Longer centers, higher lifts can be used. Creasing action between idlers is eliminated.

Each lengthwise cord in this B.F.Goodrich belt is completely surrounded by rubber — no cross threads tie them together. The rubber-borne cord body has practically the same impact resistance as the cover itself. Cords are free to "give" when an impact occurs. It distorts temporarily, distributing and absorbing a shock that would damage stiff, unyielding plies.

In addition to the regular cord body in a B.F.Goodrich cord belt, a patented *Transcord breaker* has been added. It's an extra layer of parallel cords in rubber, placed across belt width.

The impact cushion of the cord belt resists cuts and gouges; the Transcord breaker keeps the cover from stretching beyond elastic limits, provides better adhesion between cover and carcass. With each tightly twisted cord completely sealed in rubber, the cord belt resists effects of acid materials, moisture, mildew.

The first B.F.Goodrich cord belt ever made is still on the job after 12 years and over 14 million tons of coal handling. The cord belt was developed by B.F.Goodrich for tough coal and rock hauling jobs. Call in your local BFG distributor, or write: *The B. F. Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

Conveyor Belts BY

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RUBBER FOR INDUSTRY

News of the Week

Paper TRADE JOURNAL

Columbine Purchases Pulp Mill Site

GRAND JUNCTION, Colo. — Property, three and a half miles east of New Castle, has been purchased by the Columbine Development Corp. for its new multi-million dollar pulp mill.

Corporation officials believe that actual construction on the mill will get underway the first part of 1951 with cutting probably beginning in the spring of 1952.

Final action on the location of the mill was completed the week of August 14. Plans indicate the plant will be somewhat larger than previously announced.

The site was selected for two reasons according to Columbine officials. The first being that it is near the Flat Top mountains in the White River forest where most of the timber will be cut. The second was for the transportation facilities that will be available.

Brown To Rebuild Cascade Machine

BERLIN, N. H. — Brown Co.'s 196 inch, 1250 feet per minute "Mister Nibroc" at the Cascade mill will soon be flanked by a completely rebuilt paper machine, 164 inches wide, and running 1200 feet per minute. This modernized machine will feature the latest types of equipment.

The stock preparation system will be modernized to fit the improved paper-making facilities. Work is in charge of P. Lepage, of Brown's engineering department, and H. Stafford, power engineer.

Completion of the work is scheduled for the spring of 1951.

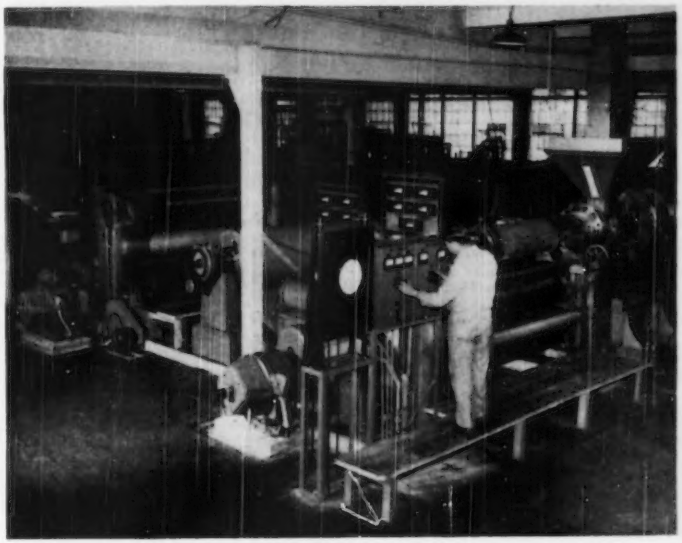
Lee Orders Ventilating System

VICKSBURG, Mich. — Lee Paper Co. has ordered a complete ventilating system from J. O. Ross Engineering Corp. This work covers a hood and exhaust system for paper machine; hood and exhaust system for auxiliary processing, and a complete basement ventilation system.

Funds For Alaska's Roadways

WASHINGTON, D. C. — Funds for opening roadways into Alaska's Tongass forest, and for other forest road improvements, have finally been authorized by Congress.

Among miscellaneous authorizations recently approved, Congress allotted $37,500,000 for forest highways, and $3,500,000 for Tongass forest road work.



St. Regis' Second Polyethylene-Coater

General view of St. Regis Paper Co.'s newest polyethylene-coating equipment placed in commercial production during August at the company's Carthage, N. Y., paper mill. The 10-ton coater, designed to specification, can operate in a range from 50 to 600 feet per minute, offering a capacity of upwards of 3000 pounds of polyethylene-coated paper per hour in any thickness from one-half to seven mils, and in any width up to 90 inches. Kraft paper moves through a series of rolls at the front of the machine to receive the plastic coating, and then is carried to the rear of the machine for rewinding and slitting. Elaborate electrical controls insure coatings of highest quality.

ECA Authorizations

WASHINGTON, D. C.—Paper and related products totaling over $500,000 were included in ECA authorizations this week for various foreign recipients.

Paper authorizations were: for France, $359,000, and Germany, $150,000.

Bird & Son, Shreveport, La.

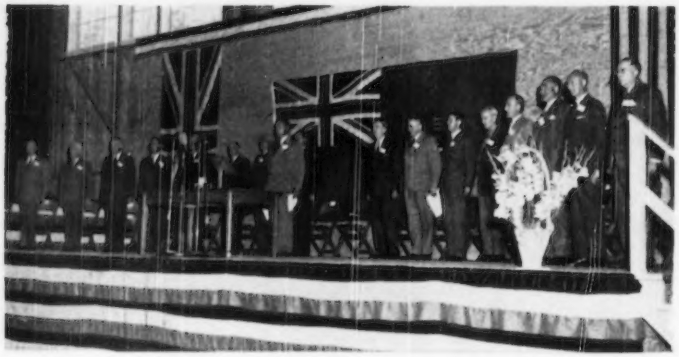
The J. O. Ross Engineering Corp. provided a complete Transite and steel hood and exhaust system for the felt machine of the suspended type having exhaust fan units mounted on the roof of the building.

In addition a Ross Vapor Absorption System was provided for the felt machine which has the feature of providing the heat supply by means of direct gas fired heater equipment utilizing high pressure natural gas for fuel. All air supplied to the system of nozzle pipes on the machine is taken from outside and passed through filters prior to entering the heater. The system is provided with flame and temperature safety equipment of the latest design as approved by Insurance Underwriters. The fan apparatus equipment is located in a lean-to at the side of the main machine building.

A considerable portion of the stock preparation equipment and stock chest agitation equipment was furnished by Shartle Brothers Machine Co., Middletown, Ohio, and Dilts Machine Works, Fulton, N. Y., Divisions of the Black-Clawson Co., Inc., Hamilton, Ohio.

Paper stock is prepared in a Dilts 64" by 60" continuous breaker beater. Rag stock is prepared in three (3) 56" by 48" Dilts rag felt beaters of 1,200 pounds capacity each. Variable pitch propeller agitators were supplied for the wood stock chest, the paper stock chest, and the machine chest while a paddle type agitator was supplied for the rag stock chest.

All of this equipment is of modern design throughout in keeping with everything else in this latest addition to Bird & Son's manufacturing facilities.



MacMillan Export Co.'s Opening Ceremony

400 persons attended the opening ceremony at the new MacMillan plant on August 14. Complete story of the $19 million project is contained elsewhere in this issue. Pictured above are C. Crispin, Manager; W. G. MacKenzie; James Stewart, general manager of the Canadian Bank of Commerce; Mayor Westwood of Nanaimo; Maj. Gen. G. R. Pearkes, M. P.; Hon. E. T. Kenney, Minister of Lands and Forests; Premier Johnson; B. M. Hoffmeister, President; Chief Justice Gordon McG. Sloan; Hon. Robert W. Mayhew; Hon. Herbert Anscomb, Anthony Benn, London, Eng.; Dr. C. D. Orchard; J. P. Weyerhaeuser, Jr., Tacoma, Wash.; H. R. MacMillan, Chairman of Board; W. J. Van Dusen, Vice-Chairman and Howard A Simons, Consulting Engineer in Charge of Pulp Mill Planning and Design.

Waste Liquor As Fuel

APPLETON, Wisc. — Waste liquor from the paper industry's sulphite pulp mills—long Wisconsin's No. 1 industrial water pollution problem — may turn out to be a valuable "coal mine," if experiments by the Sulphite Manufacturers' Research league continue to be successful.

Scientists of the league assert that the 1400 tons of wood solids dissolved in the sulphite liquor produced daily in the state could become the equivalent of about half that many tons of coal if the sulphite-for-fuel theory can be worked out to become completely practical.

Fighting Paper Wanted

Invitations for bids have been issued by the New York Quartermaster Procurement Agency, 111 East 16th street, New York 3, N. Y., on QM-30-280-51-218. Item 7 — Paper: stencil, duplicating machine, dry process, waxless, blue, size 8½ x 18", 36,500 quires. Item 8 — Paper: wrapping, kraft, No. 2 roll form, sub. 100, width 36", ⅞" to 1½" hole wooden plug, 9" diameter, 600 rolls. Item 9 — Tape: cellulose, transparent, ¾" width, length 36 yards, 1" core, 20,000 rolls.

Bids will be opened September 28, 1950, at 11:00 a.m. (EST) at the New York office. Delivery schedule: For each item bid on, bidder to state best possible delivery date he is in a position to offer. This procurement is for the U. S. Marine Corps.

QM-30-280-51-186, covering Case, Liner, waterproof, 33,000 each. Bids will be opened September 22, 1950, at 11:00 a.m. (EDST), at the New York office. Delivery schedule: To be completed by October 25, 1950. This procurement is for the U. S. Army.

United Board Names McCormack

SYRACUSE, N. Y.—United Board and Carton Corp. has named Robert B. McCormack to the carton sales staff.

Mr. McCormack joined United Board and Carton in September, 1948, and was in the Sales Service Department at the home office in Syracuse until January, 1950, at which time he was transferred to the New York sales office. He will cover the Northern New Jersey territory and Orange and Rockland Counties of New York.

Gardner Names Phillips

MIDDLETOWN, Ohio — The Gardner Board and Carton Co. announced on August 22 the appointment of Dean K. Phillips as assistant director of public relations.

Eastman's New Factory

The new Eastman Tag & Label factory in Los Angeles swung into production in July, commemorating the thirty-sixth anniversary of the company. The new plant, located at 720 East 59th street, occupies 35,000 square feet of floor space with an automobile parking area of 15,000 square feet and is rated the largest tag and label plant west of the Mississippi.

The new factory is a one-story reinforced concrete structure, earthquake proof, with an overhead sprinkler system. A saw tooth roof with windows gives north exposure light eliminating all glare in the factory. Fluorescent lighting is used abundantly and wall-type heaters throughout the building insure the utmost comfort to workers.

The ground floor houses the factory and production department. On the mezzanine floor running 120 feet across the front of the building is located the general, sales and executive offices together with an art department and display rooms which are served by a large reception room.

Adjoining the plant is an extensive warehouse which houses an immense stock of jumbo-size rolls of over 300 different grades and weights of tag-board, foil, cloth and papers, the basic raw products used to manufacture the thousands of different tags, labels and seals. Many of these grades embrace 16 colors of tag-board.

There are eighteen roll-fed tag, label and numbered check machines in the new plant with a capacity of several million tags per month.

One machine, built for multi-number production tags, will print on both sides and number each individual tag with up to 100 numbers. Another machine, similar to a newspaper press, prints and die-cuts tags on both the rotary and reciprocating basis, printing tags and labels in four colors, individually or in rolls. Still another machine prints two colors on the face and one color on the reverse side of the tag including numbering at the rate of 100,000 tags per hour.

Excellent transportation facilities have been provided consisting of spur track and a truck-level loading and unloading dock with three receiving stations. Lift-fork trucks are used in transporting the jumbo-size rolls of tag-board from receiving docks and freight cars, and for stacking and handling in the warehouse. The factory's manufacturing areas are unobstructed with wide-span aisles to enable electric dollies to operate quickly between the warehouse and factory—delivering slit rolls of tag-board to the automatic machines, then conveying the finished products to the shipping department.

All manufacturing steps are self-contained within the new plant. Type casting is done on Intertype and Ludlow casting machines. Specially designed equipment makes the rubber plates from which the company's products are printed. Strings are inserted in the tag holes and knots tied by stringing machines operating at a speed of 5,000 tags per hour. Wires are inserted and twisted into position by specially designed wiring machines. Boxes to fit the hundreds of different finished sizes of tags and labels are accurately made on box making machines.

The shipping department is located in the front of the plant where the latest type equipment is used in packing and to expedite shipments. Adjoining this department is the stock item department where over 500 items are kept in stock, ready for immediate delivery. Within the plant is a machine shop under the supervision of expert tag-machine specialists with all the necessary equipment to make repairs quickly and to avoid lengthy shutdowns. A modern, coded call-system of lights and sirens calls superintendents, foremen and workers to various parts of the plant and to the telephone, to keep production running smoothly.

Industry Aided by Columbia Cellulose

Steady development of the plant of the Columbia Cellulose Co. near Prince Rupert, B.C., is having reaction in allied fields of industry in the district. Already the beginnings of a multi-million foot log drive down the Skeena River from Terrace, B.C., is evident.

Cut along the Kitsumgallum River, the logs are being rolled from their decks and carried by flotation to Terrace and down the Skeena River to the mouth of the Sciota River, where they are being boomed for towing to the mill site at Watson Island. About 30 men are employed on the drive, which will last about two months or more.

Nothing spectacular is expected from the drive. "In fact," said Forest Manager, R. L. Johnson, "when the spectacular starts, so do our troubles." According to him, the Skeena is so wide and so swift that the drive will appear to be just the odd log drifting down, or standing in shallow water near shore. Massing will be avoided as much as possible. Drives will be made in periods when the river is quiet and logs can be more easily controlled. There is too much danger when the river is running high. In charge of the drive is T. A. V. Tremblay, superintendent of river operations.

Timber cutting is expected to reach a rate of approximately 100 million board feet per year, in perpetual production, and will provide year-round employment in mill and woods. The current drive will provide logs of pulp species—hemlock, balsam and spruce—for starting up the mill in 1951.

The Bulkley Valley Collieries at Telkwa, B.C., are proceeding with comprehensive plans for the expansion of their coal mining operations, and it is reported that the Columbia Cellulose Company requires 9000 tons of coal from the mine as quickly as possible. Delivery is expected to start this month and it is hoped to mine approximately 300 tons daily to fill annual requirements of 75,000 tons.

Testing, drilling and sampling, and detailed exploration of the mine, has been under way for the past year.

Armed Forces Box Requirements

At the recent formation meeting of the Weatherproof Fibre Box Group at Chicago, General Everett Busch, Commanding General of the Chicago Quartermaster Depot, informed box manufacturers present that the armed forces requirements for weatherproof fibre boxes (mostly solid fibre) over the next four months will be increased to 65,000 tons, or a rate of over 16,000 tons per month. This represents an overnight increase from recent requirements of about 3,000 tons per month.

The boxes will be mostly V2s types or V2s with sleeves. The boxes with sleeves are used for rations, components, canned goods, and boneless beef, among other items. However, also in use will be V3s, V3c and other types of so-called weatherproof boxes. In addition, the armed forces will use substantial quantities of domestic types of containers.

It is also understood that about 2,000,000 folding cartons of various sizes and styles will be required, as well as about 500,000 set-up boxes, substantial quantities of fibre cans and tubes, and quantities of fibre drums.

Canadian Freight Rates May Increase

OTTAWA — Higher freight rates are anticipated for the pulp and paper industry in Canada as a result of the recent nation-wide railway strike across Canada and the higher wage rates as well as other benefits gained by the workers in the walkout. This may also mean some higher prices for such products in certain areas of Canada.

Newsprint Procurement Authorization

WASHINGTON, D. C. — Pulp, paper and related products excluding newsprint, totaling $1 million, was authorized for procurement in Canada and the United States by the ECA for export to Germany.

An authorization for similar products for France, totaling $21,000, also was announced.

A subsequent authorization totaling $1,500,000 was announced by the agency, with the commodities destined for the United Kingdom.

Procurement authorizations under this head cumulatively to July 31 totaled $102,800,000.

Swedish Naval Stores Imports

WASHINGTON, D. C. — A drop in Swedish naval stores imports is shown for 1949 compared with the previous year, in figures received here.

Rosin imports by that country were mostly of Portuguese origin, and fell to 3,758 metric tons from the previous level of 6,177 tons.

Wood tar imports fell to 77 tons from 158, while turpentine imports totaled 374 tons, of which 360 were from this country. No 1948 figure was given for the latter commodity. No tall oil or liquid rosin were imported last year.

Relax Import Restrictions

OTTAWA—Canadian Government announces emergency import control restrictions on imports of pulp and paper products from the United States are relaxed, effective October 1. Improvement in Canada's U.S. dollar position accounts for the easing of these controls, it is believed here.

Brown Advances Paradis and Burns

BERLIN, N. H.—L. M. Cushing, manager of Brown Co.'s pulp division, recently announced the appointment of Rodolphe Paradis to assistant kraft mill superintendent under Lawrence Burns who is now serving the company as kraft mill superintendent.

E. W. KALER

Kaler Vice President of United Board

SYRACUSE, N. Y.—The board of directors of United Board and Carton Corp. has named Edwin W. Kaler, formerly general sales manager vice-president of the corporation.

CONVERTERS

Buys Bennington Paper Box

NORTH ADAMS, Mass. — The Henry Jarish, Jr., Corp., which has owned and operated the former E. A. McMillan Co. box shop for the past five years, has bought the business of the Bennington Paper Box Co. of Bennington, Vt., and will consolidate that firm's operations with its own in the local plant.

Since the early part of this year when the operations of the Bennington concern were suspended temporarily, the Jarisch plant here and its parent company of Holyoke, have been producing boxes to meet its orders under an arrangement made with Mr. Jarisch by Harry N. North, who organized the Bennington industry about 40 years ago and has been its head continuously. Mr. Jarisch said that the recent acquisition of modern equipment by the Jarisch Co. for its plant here would enable it to handle the Bennington firm's business on a permanent basis, along with its own. The Bennington concern's factory will be dismantled and the equipment and machinery disposed of.

Open Allied Envelope Mfg. Co.

DALLAS, Texas—Roy E. Stein said he would branch into envelope manufacturing September 1 with the opening of Allied Envelope Manufacturing Co., 2807 Elm. He had subleased the property of 3,125 square feet and will move in with $80,000 worth of equipment. His new press can print 25,000 envelopes an hour. He will turn out standard-size business envelopes and special size envelopes for lithographing.

Julius Rutland will be sales manager.

Baxter Mortgage

PATERSON, N. J. — A $40,000 mortgage on equipment of the Baxter Paper Corp. has been given the First National Bank and Trust Co., of Paterson. The mortgage has been filed with the Passaic County register.

Milk Carton Plant For Atlanta

ATLANTA, Ga.—International Paper Co., of New York, has let a contract for the first unit of an office and factory here for the production of paper milk cartons.

A company spokesman said the unit, estimated to cost $500,000, will be constructed on a 10-acre plot of land which International Paper purchased at 2323 North Sylvan Road, S.W.

The plant is scheduled for completion early next spring. It will be operated by the Single Service division of International Paper Co. and will employ 175 persons with an annual payroll of about $500,000. The company plans to build two additional units at the same location.

Carton Plant For Columbia

COLUMBIA, S. C. — Columbia Paper Box Co., Inc., has obtained a charter to manufacture paper boxes, cartons and other containers. Authorized capital stock is $30,000. James L. Kalleen is president.

ASSOCIATIONS

Review Safety Standards

HAMILTON, Ohio — Nine representatives of the Ohio Paper and Paper Products Safety Assn. met in Hamilton on August 21 to review the general safety standards for industries and workshops for the state of Ohio, also known as Draft 11 code. Members from Chillicothe, Middletown, and Hamilton attended the session, conducted by Kenneth L. Faist, safety coordinator for the Champion Paper and Fibre Co.

The safety standards, which are being reviewed by all types of industries throughout the state, are being revised for presentation to the state legislature.

Fourth Bolton Award Contest

CHICAGO — "Why Profit Is Everybody's Job" is the subject of the Fourth Bolton Award Contest recently announced by The American Pulp and Paper Mill Superintendents Assn., Inc. This contest is open not only to members of the Superintendents Assn. but rather to all employes in North American pulp and paper mills.

Manuscripts for the contest should preferably not exceed 1,500 words; should be typed (double-spaced) on one side of each sheet; and should be mailed to the Secretary-Treasurer, The American Pulp and Paper Mill Superintendents Assn., Inc., 111 W. Washington street, Chicago 2, Ill. Only entries postmarked before midnight November 1, 1950, will be accepted.

This contest carries $3,250 in cash prizes — $1,000, first prize; $750, second prize; $500, third prize; and ten additional prizes of $100 each. The awards will be made by John W. Bolton and Sons, Inc., of Lawrence, Mass., under the sponsorship of the Superintendents Assn.

The judges for the contest will be well qualified persons. Their decisions shall be final.

All manuscripts shall become the property of John W. Bolton and Sons, Inc. The thirteen prize-winning articles will be published in book form for free distribution.

Joint Meeting of Supts. and TAPPI

MIDDLETOWN, Ohio—"Fifteen Years of Progress in Industrial Lighting for Paper Mills" is the subject of the program of a joint dinner meeting of the Miami Valley Division of The American Pulp and Paper Mill Superintendents Assn., Inc., and the Ohio Section of TAPPI. Light for color matching also will receive consideration in the presentation.

This meeting, the first meeting of the 1950-51 season of the Miami Valley superintendents, scheduled for the evening of October 10, at the Manchester hotel, Middletown, will be under the chairmanship of John Burdsall, Crystal Tissue Co., Middletown. A sponsored cocktail party will precede the dinner.

New England Section of TAPPI

The New England Section of TAPPI will open its 1950-51 season with a meeting at the Red Lion Inn, Stockbridge, Mass., on Friday evening, September 29.

Dr. F. L. Simons of Crane & Co., Inc., will discuss "Further Investigations in the Microscopy of Beaten Fibres." E. C. Cowles of Cowles Chemical Co. will discuss "New Ideas in Fibre Treatment."

The Connecticut Valley Supts. Assn. will have a meeting on September 30 at the same location.

Reservations should be made directly with Heaton I. Treadway, The Red Lion Inn, Stockbridge, Mass.

FPRS Annual Meeting

The Forest Products Research Society has officially announced plans for holding its 1951 annual meeting and international industry show at Convention Hall in Philadelphia the week of May 7 through 11.

The Forest Products Industry Show will be international in scope with exhibiting firms represented from Canada, England, Europe and it is hoped other foreign countries.

Facilities for a very unusual showing of industrial films have also been included. A theatre seating 500 which will run a continuous display of films throughout the show on regular schedule will be in Convention Hall. Exhibitors having films of interest may submit them for showing.

FORESTRY

Organized Forest Fire Protection

WASHINGTON, D. C. — Forest land under organized protection against fire reached an all-time high of 569,169,000 acres in the United States during 1949. In the same year the nation's forest fire losses were held to 15,395,740 acres, lowest in history.

These two facts, and their obvious relationship to each other, are stressed in a recent national forest fire report published by American Forest Products Industries of Washington, D. C., sponsor of the Keep America Green fire prevention education program.

"The outstanding 1949 record is a fitting and logical climax to a decade that witnessed unprecedented progress in forest protection and fire prevention," the industry sponsored organization states in a foreword of the report.

Today 30 states provide organized protection for all forestlands within their borders. Fifty-four percent of last year's forest fires occurred on the 81,874,000 acres of unprotected land. They accounted for 83 percent of the country's timber acreage loss.

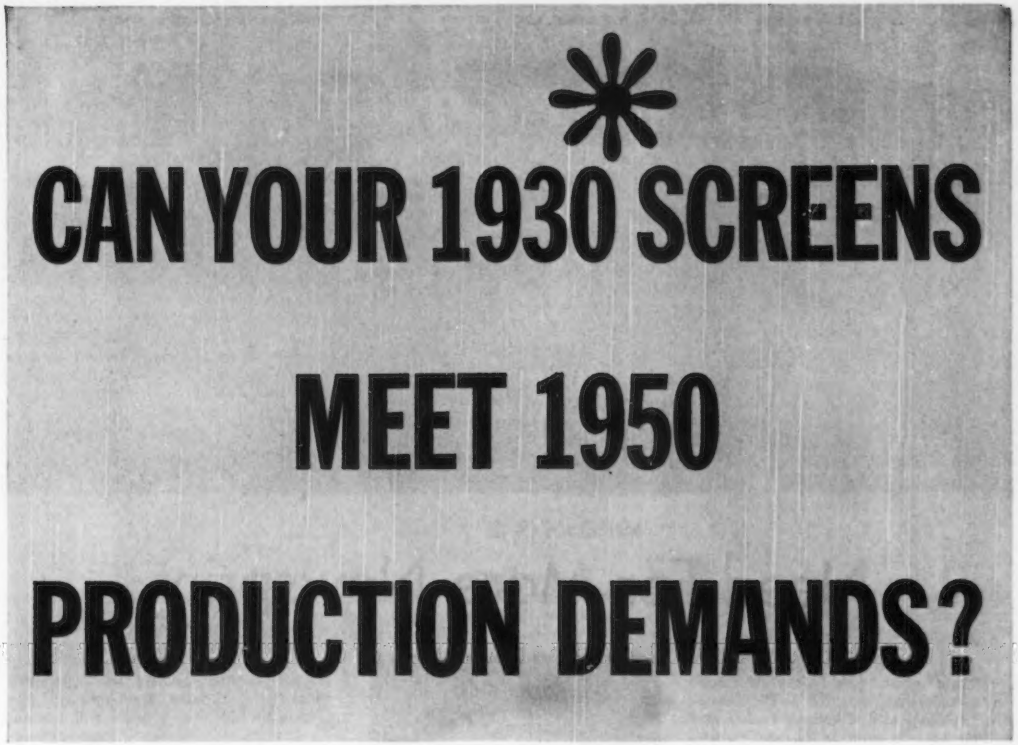
The percentage of acreage loss from fire on unprotected land was 33 times greater than on timberland under organized protection. All figures used in the report are taken from official U. S. Forest Service statistics compiled for the calendar year 1949.

S. Dak. Launches Keep Green Program

A campaign to make all South Dakota residents forest fire prevention minded is now underway throughout the state. More than 300 South Dakotans—ranchers, businessmen, foresters and educators — gathered in Rapid City's municipal auditorium on August 18 to hear Governor George Mickelson officially launch Keep South Dakota Green.

Governor Mickelson pointed out that more than 21,000 acres of South Dakota's forestland burned in 1949, and that 89 of the 273 fires were caused by direct carelessness. "The purpose of the Keep South Dakota Green program is to cut this carelessness to a minimum," the governor said.

Gary Moon, assistant state forester in charge of fire prevention and chairman of the Keep South Dakota Green committee, pointed out that the committee plans to coordinate the work of the state and federal fire fighting agencies with local organizations and add to it the support of the public. "Keep Green," he said, "will be a program of education, with an attempt to work closely with the youth of the state."



CAN YOUR 1930 SCREENS MEET 1950 PRODUCTION DEMANDS?

If your stock is still going through old Screens of limited capacity, or with relatively wide screen slots to make up for lack of capacity, your paper probably doesn't stand comparison with competitive grades screened through big, modern Bird Screens with fine cut plates.

That's no reflection on veteran Screens. It simply means that standards of capacity, of dirt removal efficiency and of screening economy have reached a different and permanently higher level.

Take a look at *your* Screens, now. If there's any question about their ability to do a 1950 screening job, check with screening headquarters — BIRD MACHINE COMPANY, South Walpole, Massachusetts.

Seven Hundred Bird Screens now in operation have already given twenty years or more of faithful service. They ought to be replaced by 1950 Model Bird Screens.

90% OF ALL THE PAPER MACHINES IN NORTH AMERICA ARE EQUIPPED WITH BIRD SCREENS

Federal Aid For Private Forests

WASHINGTON, D. C. — The Senate last week passed a House-approved measure providing for state-Federal technical assistance to private forest land owners.

Under the bill, which passed the House as H.R.7155, the Secretary of Agriculture is authorized to cooperate with the States to enable the latter to provide technical service to private forest land owners, but utilizing private consulting foresters. The bill carries an annual authorization of $2,500,000. A similar amount was authorized by the Norris-Doxey Act, but as the new bill supersedes the latter, the overall amount to be available will not be increased. However, the Norris-Doxey Act, on the recommendation of the Agriculture Department, will remain in effect until June 30, 1951, so that the revised program under the new law will not go into operation until the fiscal year 1951-52.

B. C. Increased Log Cutting

VANCOUVER, B. C. — Logging companies in British Columbia have overtaken the rate set in work in the woods this year and at the end of June 30 had cut more logs than at the same date a year ago.

Figures issued by the Forest Service of the Department of Lands and Forests in Victoria, B. C., shows the quantity of logs scaled (roughly equals the cut), in June exceeded the same month in 1949.

The Vancouver forest district, which covers most of the coast logging area, scaled 381,199,086 board feet in June, compared with 334,077,981 feet in June, 1949.

All forest districts combined scaled 458,039,064 feet in June, exceeding the June 1949 scale of 404,854,570 feet.

Cumulative total of logs scaled in all forest districts since January 1 is 1,668,522,582 feet, compared to 1,601,986,382 feet at the end of June 1949.

New Evergreen Experiments

VANCOUVER, B. C.—Experiments are now being carried out at the Green Timbers forestry station of the B. C. government with new types of evergreens which might be introduced in British Columbia, according to R. D. Gregor, superintendent.

Extensive research is being undertaken, especially with Scotch pine, in an attempt to find a more profitable tree to restock B. C.'s forests.

"We grow 7 million seedlings a year as part of the reforestation program, but it is still far behind the annual cut," he said.

"There are now less than 190 billion feet of standing timber in the coastal region, and we are cutting more than 3 million feet a year. It takes eight to 150 years to grow a tree."

Mr. Gregor said the forestry service employs 1,700 men a year and collects $7 million from forest industry.

Need For More Newsprint

CRANSTON WILLIAMS

There is need for more newsprint production capacity in North America if newspapers are to grow as they have been steadily and conservatively expanding both in advertising and circulation. Nothing in the picture says newspapers have reached the end of the road. (By-the-way, remember those dire warnings that newspapers were done for and radio would push them out more and more?)

The logical place in the United States for newsprint expansion is the South—and I warn you to discount my enthusiasm because I am a Georgian and I was secretary of the S.N.P.A. committee which brought the Lufkin, Texas, mill into being.

The most hurried check will show vast areas of pine trees available for pulpwood. The propaganda has died down that "all desirable sites are gone." It is true that kraft and board mills have secured many fine port areas but their production goes in great quantities out of the South. Newsprint sites are numerous and the pine tree grows to pulpwood size in one-fourth to one-fifth the time in the South it takes a similar pulpwood tree to grow in northern climates. If turn-over means anything, the same acreage will supply four to five times as many trees in the South in the same length of time.

The network of inland waterways for barge lines is growing in the South. These streams mean water for papermaking; water for electric power and water for transportation of newsprint. The railroads go in every direction and continue the dependable year-around vehicle.

Despite the oft-proclaimed purpose many do not realize nor understand that the Southern newspaper publishers had a motive outside of their own desire for newsprint which caused them to invest their money as stockholders in both the Lufkin and Coosa mills. They wanted another industry to take the place of cotton and tobacco—another crop, if you please. The economy of the South demanded more diversification and what is better than "a tree which only God can make" to give employment to the cutter, the trucker and the railroad; income to the farmer when he cuts the tree while not able to do other things on the farm. Pulpwood cutting is possible twelve months in the year in the South. The flow of wood to the mill is continuous.

Up to now I have spoken of the South because it is in fact "at the end of the line," remote from present newsprint production. Newsprint made in the South is close to a primary market. Estimates say both of the Texas and Alabama mills will not fill 25 percent of the South's present requirements.

As for Canada, there are two projects in which high hopes are entertained for production by 1952. These are new mills at new sites and not a result of speeding up machines and revamping mills now running. It is my hope that before long publishers located in areas of the United States logically classified as markets for these two mills will have the opportunity of talking with their sales staff. Newfoundland, now a part of Canada, has two large mills, both British-owned, and one of them (Bowater) has explored various parts of North America looking towards expanded production other than in Newfoundland.

Some would laugh off sugar cane bagasse as a raw material in lieu of pulpwood for newsprint but the scientist tells us constantly that any cellulose will make paper and it only remains to do it economically at a profit. Maybe I have faith in bagasse although I know nothing about it because I went through the period when some said newsprint could not be made into an acceptable sheet from pine trees. Bagasse would be available in many parts of the world not now having any kind of tree being used for newsprint.

Alaska has the trees and the streams for the power. The need for a rounded economy in that area in the national interest will some day bring a paper and pulp making industry to that frontier.

E. P. McGINN[1]

General

Approximately ten years after the first southern newsprint mill was started by Southland Paper Co. at Lufkin, Texas, the second mill was placed in operation by Coosa River Newsprint Co. at Coosa Pines, Ala.

Ground was broken for the new mill on April 17, 1948, and on December 5, 1949, the first cook was blown in the kraft mill. The groundwood mill was started on January 18, 1950, and the first of two newsprint paper machines went into operation on the following day.

Of course, efforts to arouse interest in the project and arrange for the financing started some years ago. In the early thirties, the Southern Newspaper Publishers Assn. began promoting the idea of newsprint mills in the South. The success of the first Southern newsprint mill, the Southland Paper Co. at Lufkin, Texas, has lent encouragement for construction of additional mills, since initial production at Southland constituted less than 10 percent of the South's newsprint requirements and its recent expansion, which doubled capacity, was partially offset by the increased demand so that at no time have they produced more than 12 to 14 percent of the southern requirements.

In addition to the need for newsprint, many people in the South saw the need for expansion of industry to improve economic conditions and take up the slack left by closing war plants in 1945 and 1946. This situation was especially true in the vicinity of Childersburg, Ala., where the closing of the Alabama Ordnance Works at the end of the war left economic stagnation.

However, the closing of this plant also created an industrial opportunity as the ordnance plant had an excellent 30,000 k.w. power plant, an 83 million gallon per day water filtration plant and a large site suitable for industrial use. In addition, the surrounding area

[1] Industrial Editor, PAPER TRADE JOURNAL.

Figure 1. Aerial view of Coosa River Newsprint Co.

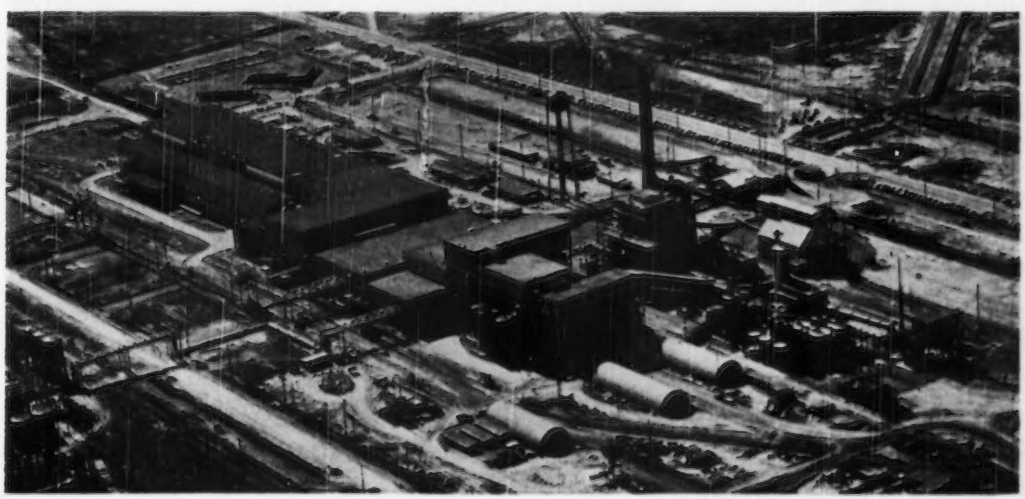


Figure 2. View of the northeast end of the pulp mill showing one of the blow tanks and cyclone separator at the right.

was well stocked with pine trees suitable for pulpwood.

A group of citizens from Talladega County formed a committee headed by Donald Comer and Thomas W. Martin, to investigate the possibility of converting the ordnance plant to peacetime industry. J. E. Sirrine Co. of Greenville, S. C. was engaged to make a survey and evaluate the industrial possibilities of the ordnance site. Results of this survey indicated that it would make a good location for a newsprint mill.

The Alabama Chamber of Commerce helped the project along by bringing together the Talladega County War Plant Reconversion Committee and the Newsprint Committee of the Southern Newspaper Publishers Assn. This soon resulted in the formation of Coosa River Co. which took over ownership of a 615 acre site together with 40 year leases on the power plant, water filtration plant and other existing facilities such as roads, railroad tracks, etc.

The Coosa River Co. then entered into an agreement with the Kimberly-Clark Corp. whereby the latter would assume full responsibility for the design and construction of the mill and for the operation and sale of its finished products; as well as having a financial interest.

All engineering for the plant was done by the Kimberly-Clark Engineering department and by J. E. Sirrine Co. Construction contracts were awarded to Daniel Construction Co., Greenville, S. C. and F. H. McGraw Co. of New York, N. Y. and Hartford, Conn.

Actual construction began on April 18, 1948 and the schedule called for completion by April, 1950. Thus the mill began operating several months ahead of schedule.

Executives of the Coosa River Newsprint Co. include: Edward Norton, president; A. G. Wakeman, executive vice-president and general manager; R. M. Watt, vice-president, in charge of sales; Walter Bouldin, secretary; W. H. Clifford, treasurer; P. A. Bachelder, assistant secretary-treasurer; W. E. Hornback, resident manager; W. W. Cross, sales manager. The board of directors includes: Cola G. Parker, Ernst Mahler, Donald Comer, Clarence Hanson, Thomas W. Martin, Stewart M. Chambers, E. K. Gaylord, John R. Kimberly, Edward L. Norton, Roy A. Roberts, John F. Tines, Jr., A. G. Wakeman and R. M. Watt.

Local Economic Effect

The impact of this new industry on the economy of Talladega County will be tremendous. More than $16 million annual wealth is being added to Talladega and surrounding counties. In 1948 the total income from cotton, the largest source of income in the county, was $1,700,000. In 1950 the income from pulpwood sold to the Coosa River Mill should be almost 1½ times as much although spread over more than one county. When we consider that the per capita annual income in Alabama is approximately $770, the importance of more than doubling the largest source of income in Talladega County may be readily understood.

Starting Operations

The start-up of this mill was one of the most successful ever recorded. On December 5, 1949 two initial cooks in the kraft mill were made and sent through the system to clean it up. Eight hours later two more cooks were made and eight hours after that the mill was in full production. The first 36 hour run of pulp was saleable. Except for a four-day shut down at Christmas, the kraft mill has been in continuous operation. The start-up of the groundwood mill and the first paper machine was also successful.

Figure 3. View of primary vortraps for use in removal of grit and dirt from screened groundwood stock. A line of secondary vortraps is also utilized to improve over-all vortrap efficiency.

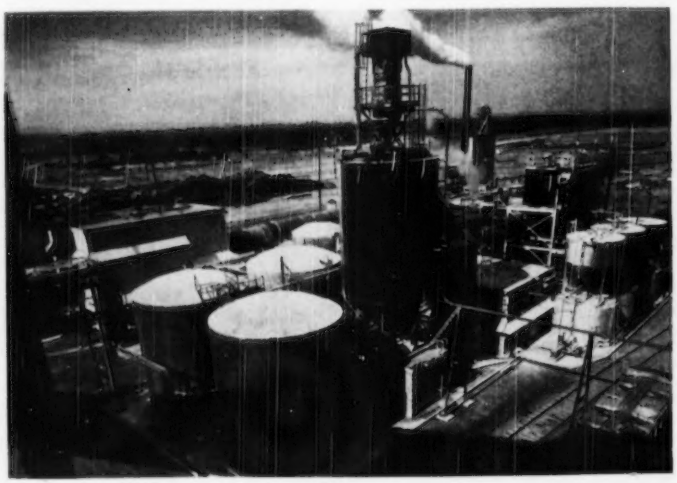


Figure 4. Caustic area. View from near top of digester building showing continuous causticizing system, liquor storage tanks and lime kiln. At right, continuous bleach-making system. At far left is the coal silo for the gas producer which furnishes fuel for lime kiln.

J. E. Sirrine Co., Engineers

Blow and Liquor Tanks

Recausticizing Plant

From the South—

—NEWSPRINT FOR THE NATION

THE COOSA RIVER NEWSPRINT COMPANY AT CHILDERSBURG, ALA., marks another forward step for paper making in the South as Newsprint from Southern Pine is again proving its worth for the paper industry. This plant, the second newsprint mill in the South, underscores another valuable use for Southern Pine—long a source for Kraft paper, rayon and cellulose plastics. Pulpwood harvested on a crop basis on a 10- to 25-year cycle from Southern forests, is now more than ever augmenting the nation's supply.

This outstanding plant combines the ultimate in materials handling and chemical treatment. Pulpwood received by truck and rail is stored in four large areas accommodating about 20,000 cords. From these areas, the logs are conveyed to the debarking drums, then to the chippers and chip storage bins. Other sets of conveyors deliver the chips to the digesters and logs to the ground wood mill, and from here the pulp is piped through the remainder of the process.

Two paper machines provide a capacity of about 350 tons of newsprint per day and additional capacity is provided for 150 tons of bleached sulphate pulp for use in the manufacture of Kleenex and other cellulose wadding products. Financed by a group of the nation's leading newspapers, the Coosa River Newsprint Company is managed on contract by the Kimberly-Clark Corporation.

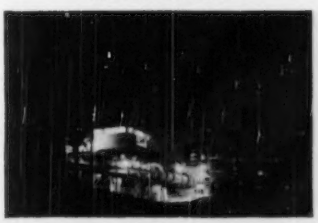
Delivered in operation only 565 calendar days after ground breaking, this $30,000,000 project serves as another example of Daniel's ability to build well and fast. The general contract shared by Daniel Construction Company and F. H. McGraw Company demonstrates once again Daniel's talent for teamwork developed on hundreds of jobs of all types and sizes. This same capacity for construction and teamwork can help speed your project to fast economical completion.

DANIEL CONSTRUCTION COMPANY, INC.

GREENVILLE, SOUTH CAROLINA **BIRMINGHAM, ALABAMA**

Conveyors for Debarked Logs

Air-Conditioned Offices



Lime Kiln

Digester Room and Chip Conveyor

The success of these starting operations are not surprising when we consider that Kimberly-Clark Corp. has started up six new mills since the end of World War II, as follows: Kapuskasing, Ont.; Niagara, Wis.; Niagara Falls, N. Y.; LongLac, Terrace Bay, Ont.; Lakeview, Neenah, Wis.; and Coosa River.

Buildings

There are eleven principal buildings on the mill site including the power plant and water filtration plant. One of the above buildings called the main building, consists of eleven separate rooms or departments, some of which, for example the digester room, practically make a separate building. However, these are all directly connected and are called the main building. The dimensions of these buildings are shown below:

Main Office, V-shaped, 140′ x 40′; Wood Receiving Office, 20′ x 26′; Wood Room, 37′ x 70′; Chip Bins, 62′ x 77′; Salt Cake & Sulfur Storage, 27′ x 80′; Recovery Boiler House, 75′ x 80′; Evaporator Building, 25′ x 92′; Slaker Building, 25′ x 45′. The Main Building, 1114′ long x 230′ maximum width, includes the following: Digester Building 30′ x 114′; Washer Room, 63′ x 98′; Bleachery, 62′ x 140′; Screen Room, 98′ x 140′; Shops, 74′ x 227′; Small Stores, 63′ x 100′; Grinder Room, 74′ x 227′; Groundwood Screening and Refining, 90′ x 227′; Toilet and Locker Rooms and Cafeteria, 90′ x 107′; Pulp Dryer Room, 55′ x 450′; and Stock Preparation and Paper Machine Room, 122′ x 470′.

All of the stock chests as well as wire and couch pits, and many of the bleaching tanks are tile or tile-lined. All the tile construction was by Stebbens Engineering Co. and is the largest installation of its kind ever made in the pulp and paper industry.

For construction of these buildings the following materials were used: 6,176 tons of structural steel; 1,900 tons of reinforcing steel; 45,000 cubic yards of concrete, 1,050,000 bricks and 250,000 square feet of roofing.

An interesting sidelight is that 620,000 square feet of Kimpreg treated lumber was used for the concrete forms. Kimpreg treatment of these forms is a Kimberly-Clark patented process which allows the forms to be easily separated from the set concrete, thus permitting the material to be used over and over again.

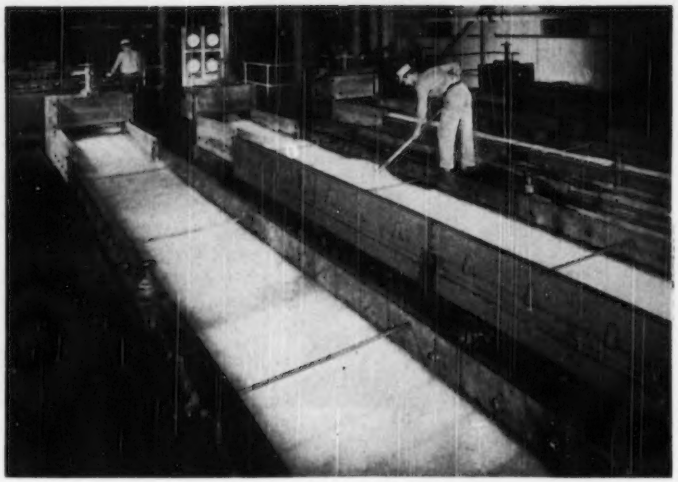


Figure 6. Screen room—view of flat screening of bleached stock. Operating panels can be seen in the background.

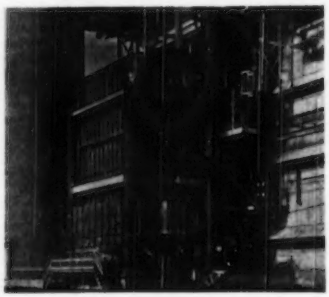


Figure 7. View of the bark boiler; note instrument panel and outdoor construction.

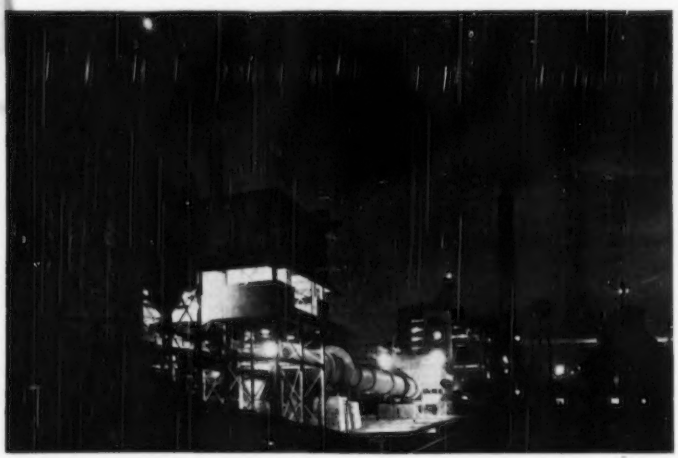


Figure 5. Night view of mill from north.

Production and Raw Material

The new mill has the following production capacities: 146 tons per day of fully bleached kraft pulp; 74 tons per day of semi-bleached kraft pulp for newsprint; 250 tons per day of groundwood for newsprint; 300 tons per day of newsprint.

For this production, the following amounts of raw materials are required each day: 707 cords of wood; 360 tons of coal; 16 tons of salt cake; 19 tons of limestone; 4 tons of burnt lime; 2 tons of sulfur dioxide; 16 tons of chlorine and 2 tons of caustic soda. In addition, the following are used: 25,000-30,000 KW; 22 million gallons of water per day; 70,000 pounds per hour of steam at 150 PSI; 150,000 pounds per hour of steam at 50 PSI. A total of 450,000 pounds of steam per hour is generated at 600 PSI from coal boilers, recovery plant and refuse burner.

Wood Supply

Within a 50 mile radius of the mill are four million acres of pulpwood and there are 18 million acres within a 100 mile radius. On a sustained yield basis four million acres within a 50 mile radius will easily produce 1½ million cords of pulpwood per year. Since the present requirements of the mill are only 230,000 cords per year, it is ob-

SERVING THE PULP AND PAPER INDUSTRIES FOR 25 YEARS

Bauer DISK REFINERS

- FOR FIBERIZING
- DIRT DISPERSAL
- PULPING
- DE-INKING
- STRENGTH DEVELOPMENT

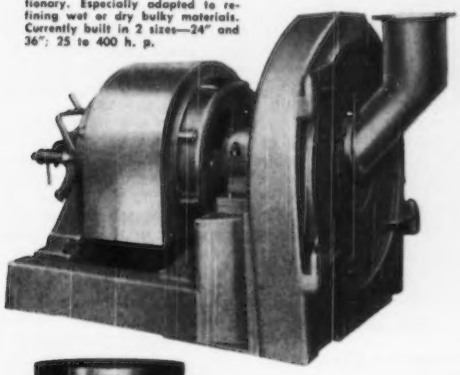
Twenty-five years' experience in scores of pulp and paper mills has conclusively proved that Bauer disk refiners perform operations which cannot be successfully accomplished with other machines.

Many patterns of plates are available for processing chips, screen rejects, waste paper, straw, and other fibrous materials. The operating clearance between plates can readily be adjusted and precisely maintained. The peculiar swirling, centrifugal action of the plates produces outstanding results in reducing, fiberizing, and uniformly dispersing the materials.

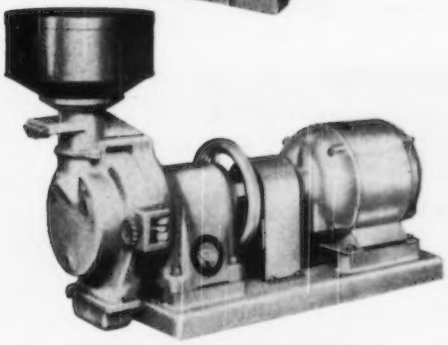
Bauer disk refiners are versatile in performance and serve a variety of purposes in different mills, being placed in the stock preparation system anywhere from preliminary reduction to final refining.

Many details are explained in our Bulletin P-1. You should read it. A copy will be gladly sent upon request.

SINGLE-DISK REFINERS. One disk rotates while the other remains stationary. Especially adapted to refining wet or dry bulky materials. Currently built in 2 sizes—24" and 36"; 25 to 400 h. p.



DOUBLE-DISK REFINERS. Both disks rotate, each driven by an individual motor. Built in 2 sizes—24" and 36"; 50 to 600 h.p.



LABORATORY MILL. Specifically built for test grinds and sample runs. Adapted to reducing wet materials such as samples of semi-cooked chips. Rotating and stationary 8" disks; 3 to 10 h.p.

BAUER-MEAD LABORATORY MILL. Makes complete strength development curves on pulps in a matter of minutes. Gives reproducible results. Ask for special leaflet No. P-6.

THE BAUER BROS. CO.

SPRINGFIELD, OHIO, U.S.A.

Established 1878

MANUFACTURERS OF DISK AND HAMMER MILLS, SHREDDERS, BAUER-McNETT CLASSIFIERS, PERMANENT MAGNETIC SEPARATORS

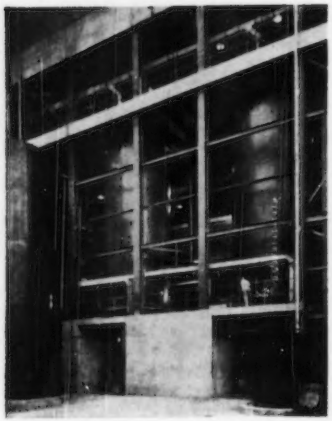


Figure 8. Outside view showing open construction of bleachery.

000 cords of wood are stored in the four woodyard areas. This is approximately three weeks supply.

At least 60 per cent of the wood is brought in by rail on the three railroads serving the mill; the Southern, Atlantic Coast Line and Central of Georgia. The other 40 per cent or less is delivered by trucks. There are many miles of paved roads within the mill site and paved roads connect directly to State Highway 91 and U. S. Highway 241.

Wood Handling

All of the wood is brought to the mill in five foot lengths. Cranes with cable slings unload wood from trucks and stack it in the woodyard.

Wood from railroad cars is removed to chain conveyors by hand and cranes equipped with Blaw-Knox or Owen Pulpwood Grapples which take ¾ cord of pulpwood at each bite. Conveyors carry it to storage or to the barking drums. Wood being taken from storage is again picked up by a crane and placed on conveyors which carry it up to barking drums. The mill is equipped with two Model 3000 Manitowoc Speed Cranes, mounted on Crawler treads, and one American Dieselectric Railroad Crane.

The two barking drums are located on a platform about fifteen feet above ground level with the discharge ends facing each other. Inclined conveyors carry the wood up to the drums. High pressure showers wash the wood as it travels up the inclined conveyors, however the barking operation is dry. The barking drums are 12 feet diameter by 45 feet long. Each drum consists of two 22½" L shells with M bars on the inside welded to ship Channel rings. Each shell is suspended by four six-inch pitch chains. Each drum is driven by a 150 HP motor with V belt drive and has a capacity of 25-30 cords per hour of pine. Two sets of gears and two sets of chain drives rotate each shell independently at 6 RPM. Bark falls through the slots to a belt conveyor which carries it over a weightometer and then up to the refuse boiler in the recovery plant.

The wood discharged from the barking drums falls to a platform containing several chain conveyors allowing the wood to be routed to any one of several places as follows: It may be sent to the kraft mill chippers; to the grinder room; to a storage space adjacent to the conveyor platform; to cull storage or if it is incompletely barked it may be sent back for another trip through one of the drums.

The best wood is selected for grinding since defects in the wood have a much lesser effect on kraft than on groundwood pulp.

Chipper and Chip Handling

Wood for the kraft mill is carried up an inclined conveyor and goes directly to the D. J. Murray ten Knife Chipper. The chips are screened on

Figure 9. Barking drums—view of sorting tables and one of the two drum barkers. One drum provides wood for the sulphate mill and the other for the groundwood mill.

vious that a permanent wood supply, with ample allowance for expansion, is definitely assured.

Although the company has purchased and leased considerable areas of woodlands, it is planned to purchase most of the wood from nearby farmers and woodland owners and hold the company land as a reserve to insure a continuous wood supply. For the present, only mature trees, which must be removed to maintain good forestry practice, will be cut on company woodlands.

A staff of fifteen to eighteen foresters will be employed to maintain the company forests and to help farmers in the area obtain maximum yields of high grade pulpwood from their woodlands. About ¼ of the forestry staff will be used for this type of work.

In 1949 the first planting of 200,000 trees was made on company owned land. These trees will be ready for harvesting in ten to fifteen years.

At Coosa River, approximately 20,-

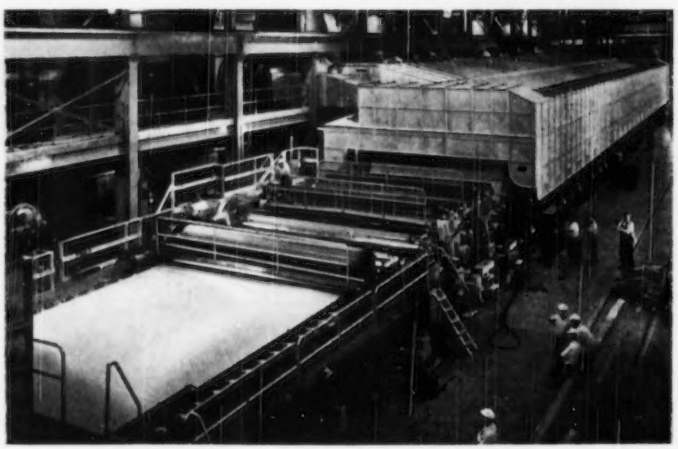
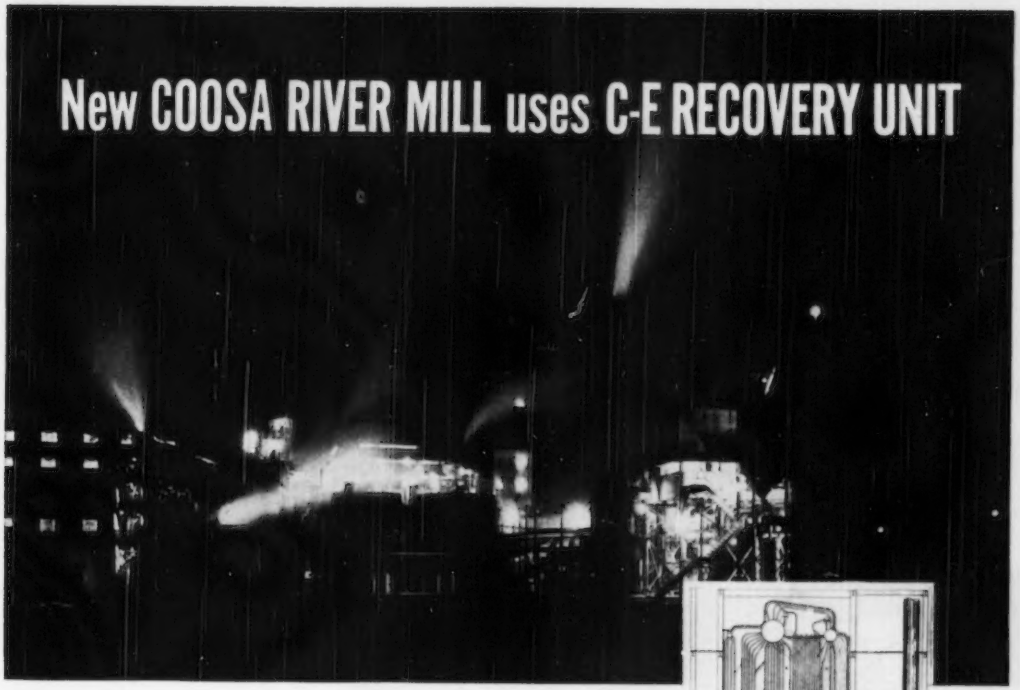


Figure 10. Machine room. General view looking down #1 paper machine.

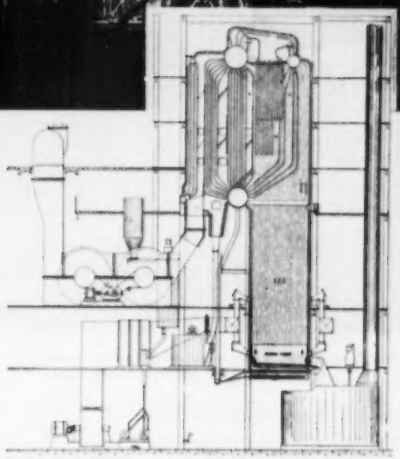
New COOSA RIVER MILL uses C-E RECOVERY UNIT



Early this year, more than three months ahead of schedule, newsprint made from southern pine began rolling out of the $32,000,000 Coosa River Newsprint Company Plant in Alabama. It is the second such plant to be built in the South, and the first in more than a decade. Pine from the river valleys about this area – forty miles southeast of Birmingham – is used. The mill is designed to turn out 350 tons of newsprint daily, and in addition produces more than 146 tons a day of dried fully bleached kraft pulp for the facial tissue and creped wadding plants of the Kimberly-Clark Corporation.

The mill is equipped with a C-E Recovery Unit (shown at right), designed to burn 750,000 pounds of black liquor solids per 24 hours and produces steam at 590 psi and 730 F.

The reliability, economy and operating efficiency of the C-E Recovery Unit have been service-proved in pulp mills all over the country. The choice of a C-E Unit by Coosa River Newsprint Company is just another example of the wide acceptance of Combustion Engineering–Superheater equipment in this field.



Sectional elevation of C-E Recovery Unit

B-390

COMBUSTION ENGINEERING–SUPERHEATER, INC.

200 Madison Avenue · New York 16, N. Y.

C-E

PRODUCTS FOR THE PAPER INDUSTRY INCLUDE RECOVERY UNITS, STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; ALSO PRESSURE VESSELS

two Rotex screens. Oversize material is sent to a D. J. Murray Chip Breaker and undersized chips and sawdust are sent to the refuse boiler. Accepted chips are carried in a bucket conveyor to the two chip bins, each of which has a capacity of ten digester charges.

Each chip bin is equipped with a screw feeder which travels underneath the sloping side of the bin and draws the chips through the slot-like opening by means of revolving augers. The chips fall to a belt conveyor which carries them over to the main belt traveling up to a point above the digesters where they are transferred to a shuttle conveyor for loading the digesters. A Merrick Weightometer accurately measures each digester charge.

Kraft Cooking and Washing

The pulp mill is divided into two separate systems to produce semi-bleached pulp for newsprint and fully bleached pulp to be dried and shipped in bales. The newsprint system has two steel digesters, each having a capacity of 3600 cubic feet. The bleached pulp system has four Smithweld digesters lined with stainless steel, each having a capacity of 3300 cubic feet. All of the digesters were built by A. O. Smith Co. and are designed for direct cooking. Automatic cooking controls were installed by the Foxboro Co. Recording charts and control elements are mounted in two panels on the digester loading floor. Six Yarway eight-inch motor operated, remote control, seatless, digester blow valves are used.

The two systems have separate blow tanks, each holding four blows. Steam from both blow tanks passes to a single heat recovery system as follows: A spray condenser on the top of an accumulator tank is connected with the blowtanks. Steam relieved during the blow activates a damper connected with a switch which starts the pump for condensing water. This condensing water is cold, contaminated, condensate from the bottom of the accumulator which is returned from a heat exchanger where the hot, contaminated, condensate pumped from the top of the accumulator is heating clean water for washing pulp. The amount of cold water going through the heat exchanger is automatically regulated to maintain a uniform temperature in the hot water. The amount of heat available in the blowsteam is approximately 2,000,000 BTU per ton of pulp.

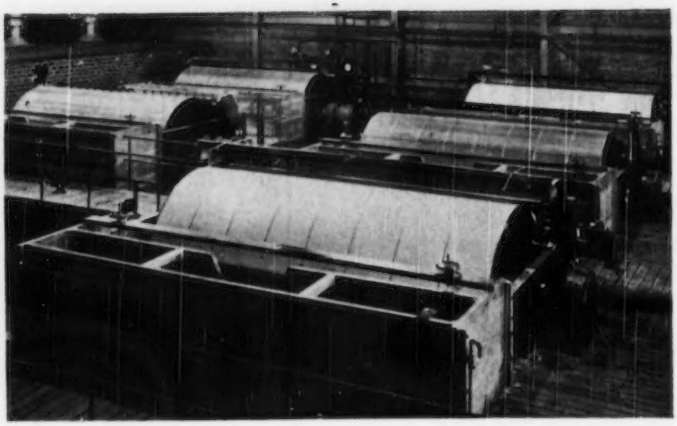


Figure 11. Groundwood decker area. The Oliver vacuum filters are used for thickening screened groundwood, prior to delivery to primary groundwood storage chest ahead of paper mill system.

Figure 13. Top floor of the digester building, looking across tops of digesters to the instrument panels in background.

Turpentine Recovery

The steam relieved from the top of the digesters during the cooking process contains turpentine. This relief steam goes first to a cyclone separator to remove fibres and liquor, then it goes to a condenser with the steam on the outside of the tubes and water inside. The amount of water going through the condenser is automatically regulated and the heated water is used for washing purposes. The condensate from the relief steam is a mixture of water and turpentine and empties into a decanter where the turpentine floats on the top of the water and is decanted

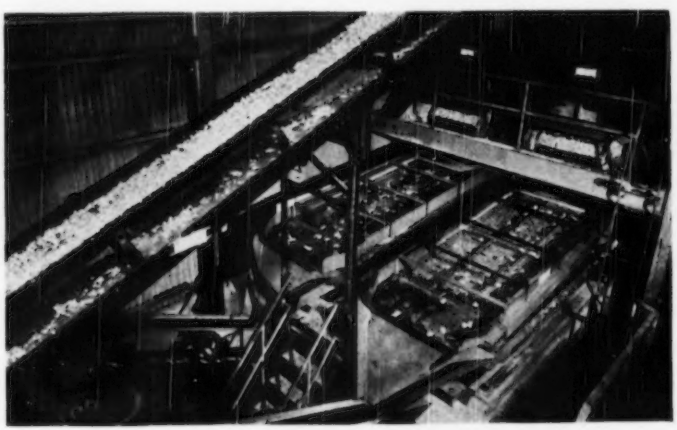


Figure 12. View of the chip screens and chip feeders in the chipper building.

Congratulations

COOSA RIVER NEWSPRINT COMPANY

. . . Our Heart is in the South, Too

Not only our heart but, to be more practical, our *equipment* is with you to help make your operations as efficient and profitable as the men who planned your new plant have every right to expect. We are happy to have supplied, among other equipment, two Suction Press Rolls, 36" x 238" and two FEATHERLITE Lumpbreaker Rolls, 20" x 230". These rolls, operating as the "business end" of the two Beloit Fourdrinier Machines, we are certain will live up to the reputation Stowe-Woodward rolls have *earned* wherever paper is made.

STOWE-WOODWARD, INC.

Craftsmen in Rubber

NEWTON UPPER FALLS 64, MASSACHUSETTS

NEW YORK OFFICE: WOOLWORTH BLDG., NEW YORK 7, N. Y.

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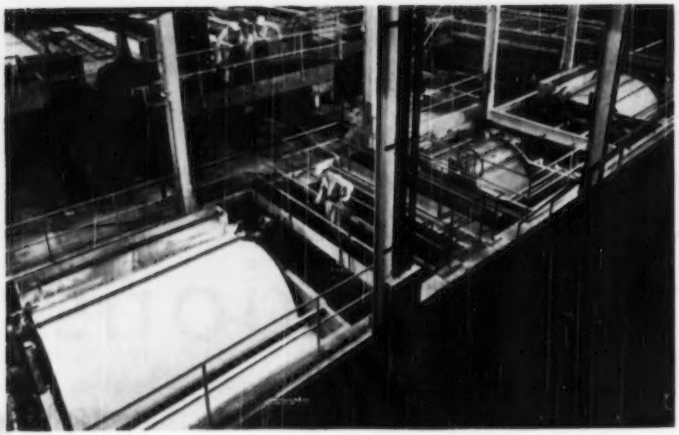


Figure 14. Screen room—showing vacuum deckers with flat screens in background.

off. The amount of turpentine may vary from 2-4 gallons per ton of pulp produced.

Pulp in the blow tanks is regulated to approximately 3 per cent by means of agitator torque regulators. Stock is then pumped to tile stock chests from where it is drawn to the Impco vibrating knotters followed immediately by the vacuum washing systems. The two IMPCO three-stage washing systems are similar except in size. The washer cylinders in the fully bleached stock system are eight feet diameter by ten feet long whereas those in the newsprint system are six feet diameter by eight feet long. Both washer systems are equipped with Ross hoods and exhaust systems.

As the stock leaves the last stage of each washer it passes through a De Zurik Consistency Regulator before going to the Screenroom. Washer instrumentation is provided by Brown Instrument Co. The pulp to be semi-bleached for newsprint is screened in one Impco rotary screen and the pulp to be fully bleached is handled in two more of the same type.

The screened pulps are thickened on three Impco vacuum deckers, two for the fully bleached system and one for the semi-bleached system.

Bleach Plant

The semi-bleached pulp is produced in a three stage system as follows: (1) Low density chlorination; (2) High density caustic extraction; (3) High density hypochlorite bleaching.

The system for production of fully bleached pulp is quite similar to the other system for the first three stages but then goes on with three additional steps as follows: (1) Low density chlorination; (2) High density caustic extraction; (3) High density hypochlorite bleaching; (4) High density caustic extraction; (5) Low density hypochlorite bleaching; (6) Low density sulphurous acid extraction.

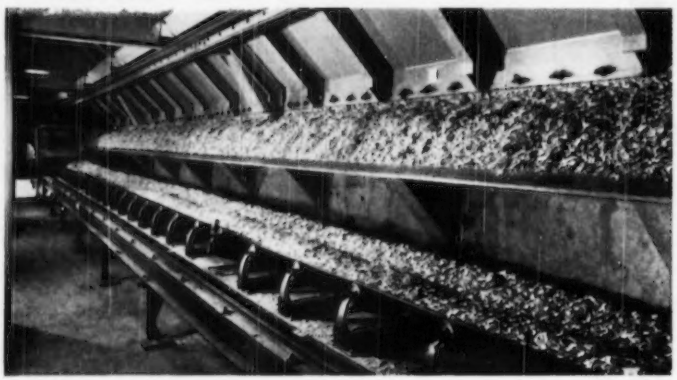


Figure 15. View at the bottom of the chipbin. Chips are pulled from bottom of bins on to a belt conveyor by the screw discharge mechanism at the far left.

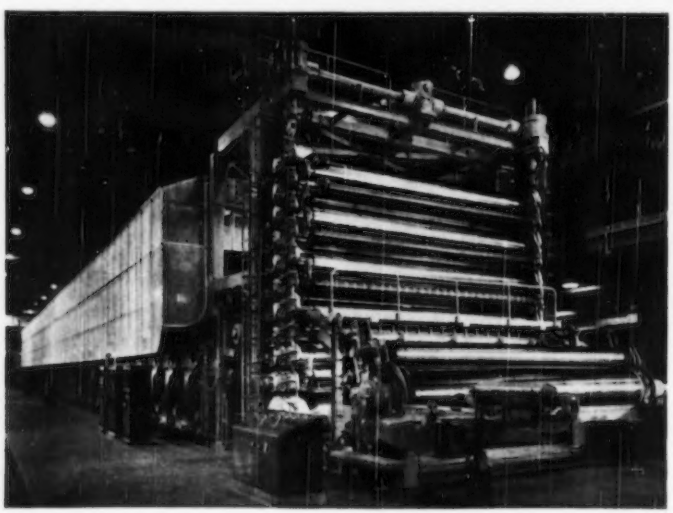


Figure 16. Dry end of #1 machine.

Each stage in both systems is followed by an Impco vacuum washer which removes solubilized waste materials and exhausted liquors and thickens the pulp for the following stage.

Both systems are continuous with the pulp moving from top to bottom in cylindrical towers except in the chlorination stage where the movement is upward. All towers in the six-stage system are tile lined concrete except the two for caustic extraction which are steel, lined with stainless steel. The three stage system consists of an acid proof tile lined tower for chlorination followed by steel towers for caustic extraction and hypochlorite bleaching. Calcium hypochlorite is made continuously by single pass chlorination of milk of lime from chlorine delivered to the mill in tank cars. Milk of lime is made up in a separate slaker and pumped in measured quantities by a Milton Roy Pump to the reaction tank.

Figure 17. Brown stock washer operating floor. Newsprint line at left. Regular bleached stock line on right. Main instrument panel is in the background, with console control panels beside the individual washers.

Instrumentation for both systems was provided by Brown Instrument Co. Semi-bleached pulp, from the third stage washer, is sent to a storage chest from which it is drawn to be blended with groundwood for the paper machines.

The fully bleached pulp is sent to a tile storage chest and thence to the bleached stock screen room where it is screened in a battery of Impco flat screens. From the screens it flows to the pulp drier machine chest from which it is drawn to feed the pulp drier.

The pulp drier was designed to handle 150 tons of pulp per day but has operated satisfactorily at rates considerably higher than this.

The machine is equipped with a feltless wet end, built by Improved Paper Machinery Co., consisting of a vacuum cylinder, first press, two drier cylinders and a second press. Both presses are equipped with pneumatic loading.

From the second press the sheet passes into the Flakt drier from which it emerges approximately 90 per cent dry. The web passes directly to a cutter which cuts it into sheets. A 600-ton Baldwin baling press automatically forms the sheets into 400 pound bales.

Recovery System

Black liquor is collected in the washer seal tanks from where it goes to the Swenson six-body sextuple effect evaporator with surface condenser and two pass first effect. Both the first and second effects are provided with stainless steel tubes as well as stainless steel protected vapor heads, heating elements and tube sheets.

When operated at design conditions this evaporator is capable of concentrating weak black liquor feed at 15 per cent total solids to a discharged liquor concentration of 53 per cent total solids.

After partial evaporation the liquor is sent to a skimming tank where the tall oil soap is removed.

After leaving the six effect evaporator, the liquor is further concentrated in a surface evaporator by hot gases from the recovery furnace. Make-up salt cake and chemicals recovered from the precipitator are added to the concentrated black liquor before it is sprayed into the combustion engineering recovery furnace.

Gases from the recovery furnace after passing through the surface evaporator, go through a Cottrell Precipitator built by Research Corp.

Smelt from the recovery furnace flows down to the enclosed dissolving tank directly below the furnace, where it is dissolved in lime mud washer effluent.

Dorr Causticizing System

The green liquor from the smelt dissolvers is clarified in a four-compartment balanced tray thickener which is practically identical to the white liquor clarifier described below. The clarified green liquor overflow from this unit flows directly to the lime slaker, where the causticizing reaction is started. It is important that the green liquor be clarified in order to remove the dregs, consisting of inert carbon, iron salts, etc. from the recovery furnace which would be trapped with the lime mud and would build up in the lime circuit.

The settled dregs from the green liquor clarifier contain considerable soda in solution with the entrained liquor. This soda is recovered by washing the dregs in a four-compartment Dorr washing thickener where the dregs are given four stages of counter-current decantation washing. This thickener is arranged with the four compartments in series so that the settled dregs are subjected to four successive settlings, being diluted prior to each settling with overflow liquor from the next settling in the series. The first settling stage is carried out in the top compartment and the settled dregs work down, while the wash water works up through the unit. The underflow from the bottom compartment is pumped from the unit and is discarded containing a negligible amount of soda. The only pump required is to remove the washed dregs from the bottom compartment since the wash water is processed up through the unit by utilizing the effect of the greater super-elevation of overflows from successively lower compartments. The dregs move down by passing through hydraulic seals in each tray. The wash water is added to the bottom compartment and the liquor overflowing the top compartment goes to weak liquor storage.

Lime from the reburned lime bin is fed continuously by means of a screw conveyor to the slaker. The rate of lime addition is controlled by means of a Ross chain type variable speed feeder. In the slaker, the lime is contacted with clarified green liquor from the green liquor Clarifier and the causticizing reaction is started. The combination lime slaker consists of a slaking tank with agitator into which is built a standard Dorr classifier section. There is an opening connecting the slaking and classification sections so these two operations are combined in a single unit with a common hydraulic level. After the lime is contacted with the green liquor in the slaking tank with the required agitation, the resulting partially causticized slurry enters the classifier section where the necessary quiescent conditions are maintained and the relatively coarse, inert grit settles out and is continuously raked from the unit by the classifier rake mechanism and discharged in a well-washed and well-drained condition.

From the slaker-classifier, the partially causticized slurry passes through three causticizer tanks in series. These tanks provide sufficient detention time for the causticizing reaction to be completed, and are equipped with stainless steel agitators.

From the causticizers, the causticized slurry enters the white liquor clarifier where the calcium carbonate is settled and the clarified white liquor is overflowed and sent to white liquor storage. The Dorr white liquor clarifier is a three-tray, four-compartment balanced type tray thickener, in which all the compartments are operated in parallel. The feed is divided four ways by means of a weir box and each fourth of the feed is fed to each thickener compartment. The overflow pipes from each compartment are set so that equal volumes of overflow are withdrawn from each compartment. The settled sludge from each compartment passes down to the compartment below it by means of a deep central boot which causes the sludge from one compartment to be transferred into the

settled sludge in the compartment below without any opportunity for the sludge to be reslurried and thus have to be resettled. The deep central boot on each tray extends down into the sludge on the tray below. In this way, the mud from each tray passes down through these central boots to the bottom compartment and a seal on each tray is produced which resists any tendency for liquor short-circuiting between compartments. Finally, the sludge is pumped from the bottom compartment by means of a single pump.

Also, the white liquor clarifier and lime mud thickener are provided with torque recorders which give a continuous record of the load on the thickener. This is not only a valuable guide to the operator but gives a record of the thickener performance during the night shifts which is valuable information for the supervisory staff.

The settled lime mud from the white liquor clarifier, containing about 40 per cent solids, is pumped to the lime mud thickener-washer, where it is given two stages of washing prior to filtration. The settling area required for a single stage of lime mud washing is only about half that required for white liquor clarification but these units were made identical, so that during an emergency period, if the white liquor clarifier was down, the lime thickener could be used as a white liquor clarifier.

In order to more efficiently utilize the excess area in the lime mud thickener, The Dorr Co. developed a design whereby a unit having the same area as the white liquor clarifier gives the lime mud two stages of washing instead of one, and during emergency periods it can be swung over to operate as a white liquor clarifier. This is accomplished by operating the top two thickener compartments in parallel and the bottom two in parallel, and both these sets in series with each other. Thus, the first stage of washing is carried out in the top two compartments and the second stage in the bottom two. In an emergency when the white liquor clarifier might be down, the top two compartments of this unit can be operated for white liquor clarification and the bottom two as a single stage of mud washing. This, of course, reduces the white liquor clarification capacity but it usually provides adequate facilities to tide over an emergency.

Figure 18. Ground floor view of digester building.

The additional stage of lime mud washing obtained with the two-stage lime-mud-washing-thickener followed by vacuum filtration, results in the soda content of the lime mud entering the kiln from the filters being reduced to about 25 per cent of what it was with the old scheme of one stage of dilution washing followed by filtration. This large reduction in soda in the lime mud results in improved filter performance from an operating and maintenance point of view and improved life of kiln lining together with a reduction in any tendency for ring formation in the kiln.

Make-up lime is added in the form of crushed limestone, carried from a storage bin on a rubber conveyor belt, over a Merrick weightometer and thence to the screw conveyor which takes it into the kiln.

The Allis-Chalmers lime kiln is 180 feet long and is heated by producer gas or may be oil-fired in emergency. The gas is generated right at the kiln, from soft coal and steam, in a gas producer built by Morgan Construction Co. Controls for the kiln and gas generator were supplied by Hays Corp. Burned lime from the kiln goes to a storage bin and thence to the slakers where it is mixed with the green liquor.

Hot lime is conveyed by means of a drag conveyor and bucket elevator to the reburned lime storage bin. Also included is a new lime storage bin for use during emergency periods when the kiln is down.

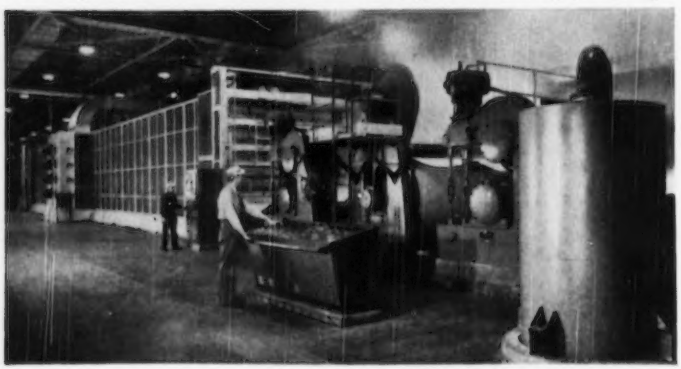


Figure 19. View of the feltless wet machine with Flakt dryer in left background. Note console panel for control of operation in foreground.

Groundwood Mill

As the pulpwood leaves the drum barkers, the best and cleanest wood is routed to the groundwood mill. By means of a series of conveyors controlled from a central point, the operator may route the pulpwood to each of the five Roberts Grinders as needed. These magazine grinders, made by Appleton Machine Co., are equipped with synthetic stones, 62 inches diameter by 66 inches long supplied by both the Norton Co. and The Carborundum Co. Five 3500 HP Allis-Chalmers Synchronous motors, rotating at 257 RPM are directly connected to the grinders.

Pulp from the grinder pits is pumped to an Allis-Chalmers vibrating type coarse screen. Accepted stock from this screen goes to a tile storage chest from which it is pumped through an Askania Consistency Regulator.

In this installation, a double-gate valve and mixing box are used to regulate consistency. A continuous sample of the regulator stock leaving the box is delivered to the consistency detector after the sample has passed through a constant-flow head box.

The consistency detector operates on a drainage rate principle, with fibers forming a mat on a rotating screen, the depth of the fibers determining the drainage rate of the water at the upstream end of the detector box. The height of the head created at the upstream end is the pressure signal which, through the Askania Jet Pipe Regulator, controls the position of the double gates by means of the hydraulic cylinder.

If the consistency drops below the desired percentage, the gate automatically opens wider on the stock side and closes proportionately on the water side, until the correct consistency is being fed to the screen. This procedure reverses if stock becomes too thick.

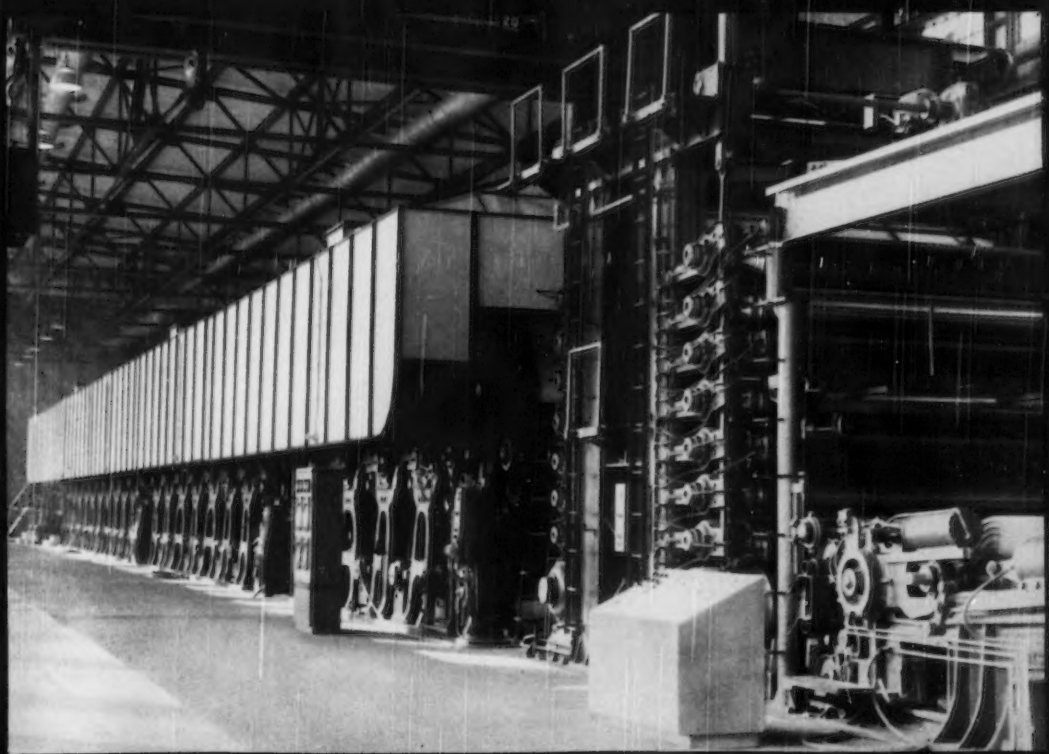
Regulated stock passes to the four primary Cowan Rotary Screens. Accepted stock goes to another tile storage chest from which it is pumped through a battery of ten, 10-inch vortraps, each handling about thirty tons of stock per day.

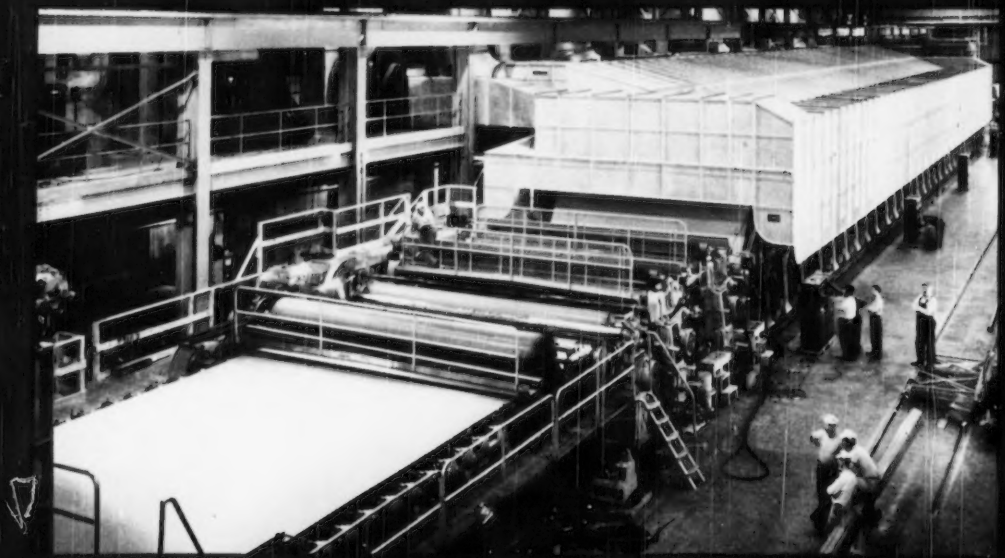
The design and layout is similar to the conventional system used for 4" Vortrap installations. However, due to the large volume of stock to be handled, the newly developed 10" Vortraps are used for primary units. The

The Warrior

Congratulations to Gulf States on the successful completion of its impressive expansion program . . . which includes this new 170" Beloit High Speed Kraft machine . . . turning out high-quality Kraft bag and wrapping paper for the E-Z Opener Bag Co., Gulf States Sales Division, in The Gulf States Paper Corporation plant at Tuscaloosa, Alabama.

BELOIT IRON WORKS, BELOIT, WISCONSIN

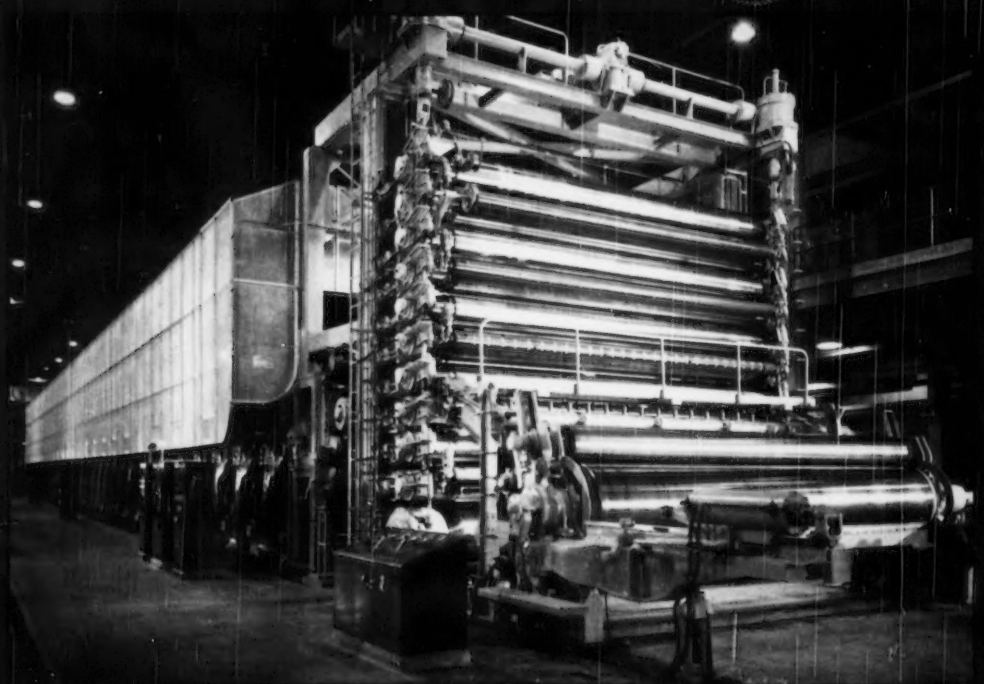




New...at Coosa River

Congratulations to Coosa River Newsprint Co. and to Kimberly-Clark Corp. for the expertly planned and executed operation at Childersburg, Ala. The recently completed No. 1 machine is shown here. The second 226" Beloit Newsprint Machine is nearing completion in this all-new plant.

BELOIT IRON WORKS, BELOIT, WISCONSIN



primary section of this system consists of ten 10″ Vortraps designed to handle a maximum of 12,000 g.p.m. The primary bank of Vortraps is divided into two sections and each section is supplied with its separate pump. The 10″ Vortraps have approximately four times the capacity of the 4″ units and require only about one-half of the power consumed by the smaller Vortraps. The secondary portion of this system is a conventional secondary Vortrap system, consisting of three 4″ Vortraps.

The major consideration with this type of Vortrap system is the removal of heavy dirt, such as sand and similar particles. However, by following the same principles of bleeding the primaries to the 4″ secondary Vortrap system, considerable wood dirt is removed. These systems eliminate any necessity for rifflers or similar equipment and provide for a much more effective stock cleaning system with a resulting savings in space and building requirements.

Accepted stock from Vortraps goes to a tile chest and thence to a battery of five Oliver vacuum deckers where it is thickened and sent to another tile storage chest.

Rejects from the four Cowan primary screens are sent to a fifth unit which is used as a tailing screen. Accepted stock from this unit is put back into the system for rescreening. Rejects from this screen together with rejects from the vibrating coarse screen are put through a Jeffrey hammermill then sent to a battery of three Haug drainers. The dewatered fiber from each drainer drops down into a Bauer refiner. These three refiners reduce the coarse fiber to usable pulp which is sent to the secondary screen chest for rescreening in the tailing screen.

Stock Preparation

Semi-bleached kraft pulp for newsprint is pumped from the storage chest to a head box from where it flows through the two Jones Majestic Jordans and six Morden stockmakers which are piped to allow any combination of series or parallel arrangements. Normal operation is two parallel lines of one Jordan and three stockmakers in series. The Jordans may also be used in parallel to handle all of the groundwood stock and the semi-bleached kraft treated in two parallel lines of three stockmakers in series.

The refined semi-bleached kraft together with the groundwood and slush broke stock are metered in Fischer and Porter automatic proportioning systems, one for each paper machine. Alum and dye solutions are also added continuously with these systems. Groundwood and semi-bleached kraft pulp are mixed in a proportion of 4:1. The amount of broke added varies with the amount available. The proportioned stock flows to the mixed stock chests.

Each of the paper machines is equipped with a Trimbey metering stuff box, consisting of a single rotary meter for handling the mixed stock; to the drive of this meter is geared a small adjustable color meter—for easy adjustment of the proper amount of color to be added. The entire unit, in each case, is driven by a 2-HP General Electric synchronous motor. These motors are tied in with the couch roll drive of their respective paper machines and, in this manner, the quantity of pulp delivered to the wire is automatically maintained in exactly the proper relation to wire speed, to give the required basis weight of the paper to be made. Any change in machine speed is instantly compensated for by a corresponding and equal change in the rate of delivery of the pulp to the wire.

The regulated stock from the stuff meters passes through two Jones high speed refiners arranged in parallel and used as ticklers. The stock for each machine is then diluted and pumped to batteries of four type 3A Bird screens equipped with 20-cut plates.

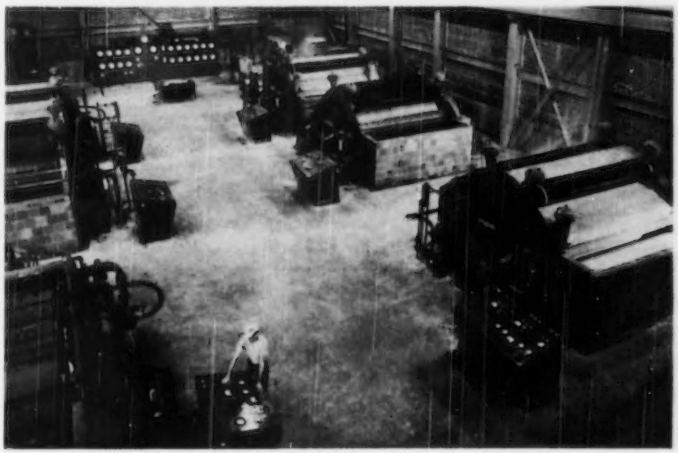


Figure 20. Bleacher operating floor, showing the console panels for individual washers and main operating panel in far background. Also shown are rotometers for metering in chemicals at individual washers.

Paper Machines

The two Beloit Fourdriniers were built for 1500 fpm, with rolls balanced for 2000 fpm, and are duplicates except for hand; so the following description is for each: A stainless-steel lined distributor, headbox and slice of special design, complete with motor-operated rectifier rolls and slice lift, delivers the stock to the wire. This headbox incorporates various new features developed by Kimberly-Clark Corp., and includes Beloit's latest air pressure control. The wire is 100 feet 6 inches long and 226 inches wide. White water trays are stainless steel and the fourdrinier runout beams as well as all other main beams and cross ties are stainless covered.

The six flat suction boxes are of stainless steel and are equipped with wax-impregnated, end-grain maple covers. Both wire and couch pits are tile-lined. The 42 inch diameter couch rolls are each equipped with double suction boxes. Each machine is equipped with a Stowe-Woodward *Featherlite* lumpbreaker roll.

Vacuum for each machine is provided by one K-8 Nash Hytor for flat boxes; three H-11 Nash Hytor pumps for the couch roll; two H-11 Nash Hytor pumps for the suction presses.

In the press section are two straight through presses, having 36″ Stowe-Woodward rubber covered suction press rolls. The top rolls are carried in anti-friction bearings, supported from patented press framing which completely encloses the air diaphragm loading mechanisms, and in which are mounted the control instruments regulating nip pressure. Felts are guided by diaphragm operated swing-type guides. Felt rolls, also, are anti-friction bearing mounted.

The dryer section consists of 54 five-foot diameter paper driers with 10 four-foot diameter felt driers for the six drier felts. The dryers are carried in continuously lubricated self-aligning roller bearings, supported on post type front framing. Back framing completely encloses the continuously lubricated dryer gear train. Rope feed equipment with automatic transfer between sections is used. The Lodding doctors are oscillated by air diaphragms; felts are guided by air diaphragm operated guides.

Steam is supplied to the driers in three sections controlled by Brown Instruments. The last dryer is driven separately from the gear train and is arranged for cooling.

Condensate is removed from the driers by Midwest-Fulton vacuum systems.

Hoods, ventilation and air-heating

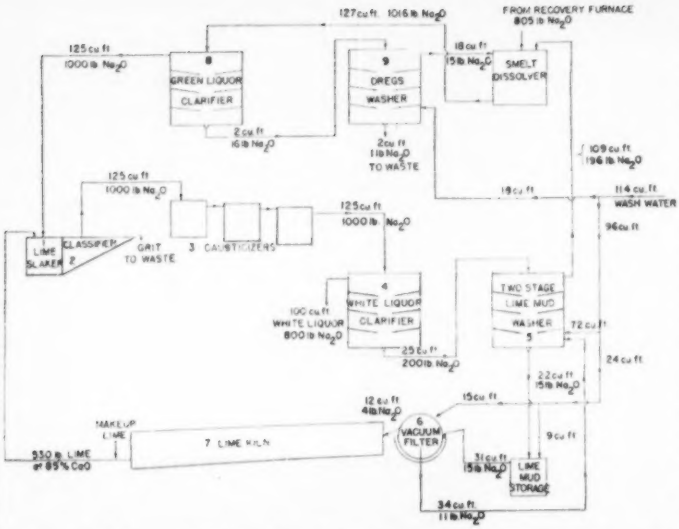


Figure 21. Kraft Recausticizing Plant—Process Quantity Flowsheet. All quantities are expressed as cubic feet or pounds per ton of air dry pulp.

Basis: 100 Cu. Ft. White Liquor Per Ton Pulp
8.0 Lb. Total Alkali as Na_2O Per Cu. Ft.
7.0 Lb. Active Alkali as Na_2O Per Cu. Ft.
30% Sulphidity
White Liquor Clarifier Underflow 33% Solids
Lime Mud Washer Underflow 40% Solids
Filter Cake 55% Solids
900 Lb. of Lime Mud (Dry) Per Ton of Pulp Handled in Steps of 1 to 6 Incl.
15 Lb. of Dregs Per Ton of Pulp Handled in Steps 8 and 9.
Soda Reported Is Total Soda as Na_2O
Volumes Reported are Liquor Volumes Without Suspended Solids

systems were provided by J. O. Ross, Engineering Co. The calender stack is of the latest Beloit open-side design, allowing ease of roll changing and virtually plug-free operation. Each stack contains one 34-inch diameter bottom roll, one 20-inch second roll and one 16-inch upper rolls, all equipped with Vickery doctors.

The patented Beloit reel is equipped with air cylinders, both in the starting and winding positions, to give accurate control of roll-to-drum pressure.

The winders are equipped with roll conveyors which move the finished rolls toward the back of the paper machine, automatically pulling out the winder shaft.

Heavy duty unwinding stands and Beloit double drum winder, complete with latest shaft and roll handling equipment, are built for 4000 fpm paper speed.

Underneath each calender stack a Jones Lieback disintegrator receives broke through a slot in the floor. Each disintegrator extends the full width of the machine and contains a full length shaft with four propellers which force the stock from each end toward the center. Each unit has a volume of 2,293 cubic feet and is completely lined with tile. Disintegrated broke is pumped up to Oliver rubber covered thickeners, eight feet diameter by 16 feet long. There are two of these units, one adjacent to the headbox of each paper machine. The thickened broke is passed through Emerson Jordans, two for each machine, and thence to broke storage chests.

In addition to an overhead crane the machine room is also equipped with a car which travels on a narrow gauge track the full length of the machine room and across the room in front of the winders.

Paper Machine Drives

Both machines are driven through Falk reduction gears by General Electric sectional drives with electronic-amplidyne regulators. The drives are designed to operate up to 1800 feet per minute and the paper machines are dynamically balanced for that speed.

Each sectional drive system is in effect a group of six individual machine drives. Each of the six sections —couch, first and second press, three section drier, calender, and reel — is mechanically independent of all other units. The only physical connection between sections is the web of paper. However, all sections are electrically coordinated to provide a closely integrated machine throughout.

Each section, consisting of one main drive motor and in some instances with additional helper drives, is controlled from a completely adjustable - voltage generator. These sections are held in precise and accurate speed relationships with each other through a master brain consisting of an electronic-amplidyne regulating system. This system is capable of controlling the whole machine, a total of 14 drive motors ranging from two horsepower to 400 horsepower, with one master rheostat control. This amounts to a total of over 1500 horsepower of adjustable speed drive. On the other hand, when required for maintenance, wash-up, or machine adjustments, each section may be controlled individually through all required operations from jogging to full run.

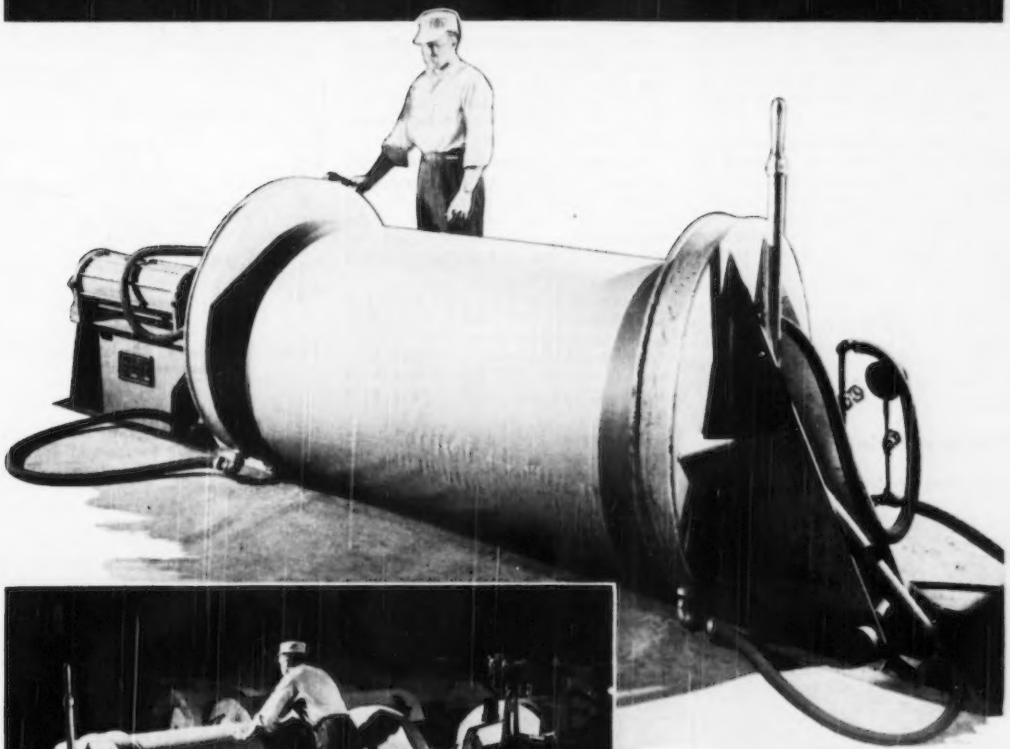
Because each section drive is supplied from its own generator, the drive is isolated from any disturbances accompanying starting and stopping of other sections or load changes (such as snap-offs). On the other hand, smooth adjustment of over-all speed can be accomplished while paper is on the machine.

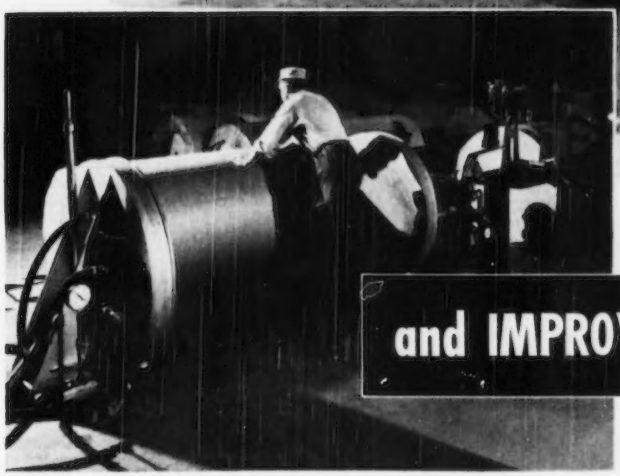
The control panel for each section is enclosed in separately packaged factory assembled units. Each section drive in the multiple-generator system operates only on generator - voltage control, without change in the motor field excitation — therefore, at maximum torque efficiency. The section drive speed is measured by a tachometer-generator, whose output voltage is compared through a section draw rheostat against the over-all constant reference voltage of the entire drive. To the extent that the tachometer-generator voltage differs from the reference voltage, the electronic-amplifier responds almost instantly through an amplidyne exciter to change the generator voltage, restoring the desired drive speed.

In addition to the two sectional drive systems, General Electric also supplied two adjustable speed winder drives with regenerative tension control. Each consists of a double motor drive designed for 4000 feet per minute top speed. The drive motors are rated at 60 horsepower and operate from a 230 volt d-c supply at a top speed of 575 revolutions per minute. A braking generator on the unwind stand is used to provide the regenerative tension and assist the main generator in supplying power to the driving motors. The winder drive is amplidyne controlled and is capable of maintaining any desired tension at all times during run, acceleration, and deceleration.

The 212-inch winder drive is designed to maintain a tension of two pounds per inch of width on 32 pound newsprint. The main operating features of the electrical regenerative braking are that it provides instantaneous control of both stalled and running tension. It automatically maintains the selected tension on the sheet between the mill roll, the unwind stand, and the winder—during running, threading, accelerating, and decelerating. It can also maintain a taut sheet at standstill. And, through the amplidyne control, it automatically compensates for decreasing mill-roll diameter at all winder speeds and during changes of speed as well as automatically compensating for the inertia of the mill roll. This means that braking tension is automatically reduced during acceleration to avoid breaking or overstressing the

CUT HANDLING COSTS





and IMPROVE ROLL QUALITY

More and more mills are doing it with . . .

THE VALLEY ROLL END PASTER

VALLEY IRON WORKS CO., APPLETON, WISCONSIN

sheet, and automatically increased during deceleration to avoid a slack sheet.

In addition to the operating advantages, the use of electric regenerative breaking also recovers power that otherwise would be dissipated in mechanical braking, thus making the unit much more economical in operation. The amount of power thus saved and returned to the winder motors may go as high as 60 per cent of the winder motor input.

The tension maintained through amplidyne control may be adjusted by means of a rheostat mounted on the operator's control panel, and a meter is provided to indicate the amount of tension being held. A booster generator is supplied to maintain tension under stalled and slow speed operation. Also, the operator may accelerate and decelerate the winder as rapidly as desired because current limit protection prevents overload of the winder motors, as well as minimizing mechanical wear on the over-all machine.

Finishing and Shipping

Finished rolls of newsprint are pulled from the winder on a conveyor and taken to the shipping room near the finishing ends of the paper machines. The rolls are wrapped and then simultaneously weighed and headed on a combination scale and header supplied by Valley Iron Works. The rolls for shipment are moved to the loading platform and those for storage are taken to the roll storage building located at the end of the pulp drier building.

For rolls that must be rewound, the finishing room is equipped with a Langston 72" type CA slitter and rewinder which handles rolls up to 72" wide and 50" diameter at a maximum speed of 1500 FPM. It is driven by a DC variable speed motor and the unwinding stand is equipped with a water cooled brake. The machine is equipped with friction and power driven shear cut slitters.

Power Generation

The power plant of the Alabama Ordnance Works which is leased from the Federal Government by Coosa River has a generating capacity of 30,000 KW at 11,200 volts and boiler capacity of 450,000 pounds of steam per hour at 600 PSI and 750°F. The furnaces are fired with pulverized coal.

The Combustion Engineering Recovery furnace produces 112,000 pounds of steam per hour at 600 PSI, 750°F. This furnace is equipped with a Republic measuring type regulator (measuring air flow) which employs a spring loaded air flow measuring element and positions the operating level of the forced draft fan damper, to maintain a constant air flow in accordance with the loading set up manually at the instrument and control panel board.

Each regulator is provided with a remote manual sub-panel assembly consisting of a position indicating gauge, synchronizing gauge, transfer valve, and manual loading element.

The Babcock and Wilcox bark and refuse boiler produces 66,800 pounds per hour at 600 PSI, 750° F. This burner is designed to burn hogged fuel but is also equipped with a supplementary oil burner.

The refuse burner is equipped with a Republic measuring type regulator which controls the speed of the induced draft fan by positioning the steam turbine valve feeding the induced draft fan, to maintain constant furnace pressure.

Steam from both of these boilers is sent through a 14" overhead pipe line to the main boiler plant which is 3200 feet from the recovery and bark boilers. A parallel 20" line brings back steam at 150 PSI, 370° F. for pulp cooking.

These pipe lines are supported on concrete piers 3-4 feet above the ground except where passing over four roadways when they are elevated to fifteen feet. These lines are equipped with necessary guides and rollers as well as American District Steam Co. piston-ring type expansion points, which can be unpacked and repacked without shutting off the steam.

The Republic Pressure Reducing and Desuperheating Station, in the main boiler plant, is designed for a maximum capacity of 120,000 pounds per hour, an initial pressure of 585 PSI, 750° F, and a final pressure of 150 PSI, 380° F. The power operated pressure reducing valve is a 5", 600 PSI cast steel, flanged, lever operated valve with stainless steel internals. The pressure regulator for controlling the operation of the valve is pneumatically operated. The Desuperheater is the steam atomizing type with a carbon steel body and stellite-faced throat. The operation of the desuperheater is controlled by a be-metallic element and a pneumatically operated temperature regulator. A type "CTP" recorder (two pen type) records the final temperature and pressure of the desuperheated steam.

The second Republic Pressure Reducing Station is designed for a maximum capacity of 55,000 pounds per hour at an initial condition of 150 PSI, 370° F., and a final pressure of 50 PSI. At this station a pneumatically operated Republic regulator and power cylinder operates the 3" cast steel lever valve (stainless steel internals) to maintain accurate control of the final pressure and temperature of the steam which are recorded by a two pen Republic "CTP" recorder.

Ashes from the gas producer, as well as the new bark burning furnace, are handled hydraulically through a pipe line type sluice system, the latter

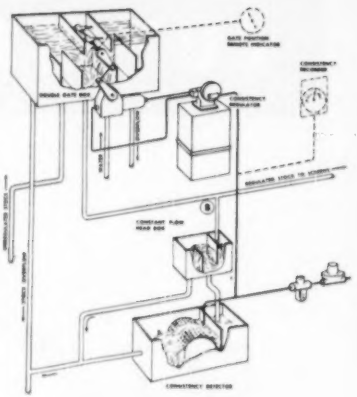


Figure 22. Askania Regulator Schematic Groundwood Control.

being equipped with jetting nozzles and Jetpulsion pumps. Feeding inlets with suitable grids for breaking clinkers are located in front of each of the clean-out doors and the various conveyor branches are inter-connected into a single 8" discharge pipe line that transports the water and ashes to an ash dump or fill ground area located 800 feet from the power plant.

Dust from the dust collector hoppers of the bark burning boiler is handled pneumatically by means of a Hydroveyor system. The vacuum producer serving the dust collector hopper discharges to an elevated air separator and from the latter water and dust are transported through the same pipe line that serves the furnace bottom ash disposal system.

An outstanding feature of the ash and fly ash conveying systems is that they are enclosed throughout and the material is conveyed directly from the points of accumulation to the fill ground area in a single operation and without any rehandling at any point.

Fire Protection

The mill is equipped with the most modern fire protection equipment. Automatic sprinklers protect the woodyards as well as the buildings. A completely equipped portable fire fighting unit, called the Porto Pumper, may be hauled to the scene of a fire by any car or truck equipped with a trailer hitch. This unit carries its own pump and four cycle engine as well as 200 gallons of water. It is equipped with fog nozzles but may also be used for throwing a straight stream.

An elevated tank, 125 feet above the ground holds 100,000 gallons of water for fire use. This tank, which is of welded construction, was supplied by Chicago Bridge & Iron Co.

List of Equipment & Suppliers

Allis-Chalmers Mfg. Co.: *Lime Kiln; Transformers; Switchgear; Pumps; Motors.*

Alpha Cement Co.: *Cement.*

Alphons-Custodis Chimney Co.: *Chimney.*

American District Steam Co.: *Heater.*

American Hoist and Derrick Co.: *Locomotive Crane.*

American Blower Corp.: *Blowers.*

Appleton Machine Co.: *Grinders*

Askania Regulator Co.: *Instruments.*

A. S. Aloe Co.: *First Aid Equipment.*

Allen Bradley Co.: *Electrical Suppliers.*

Babcock and Wilcox Co.: *Refuse Furnace.*

Badham Insulation Co.: *Cork Roof Insulation.*

Bagby Elevator and Electric Co.: *Electrical Installations; Elevator Erection.*

Bailey Meter Co.: *Instruments.*

Baldwin Locomotive Works: *Pulp Baling Press.*

Bauer Brothers Co.: *Refiners.*

Wm. Bayley Co.: *Steel Sash.*

Beloit Iron Works: *Paper Machines.*

Berger Mfg. Co. Div. of Republic Steel Corp.: *Shelving and Lockers.*

Bin-Dicator Co.: *Bindicators.*

Bingham Pump Co.: *Pumps.*

Bignall and Keller Machine Works: *Pipe Machine.*

Bird Machine Co.: *Screens*

Birmingham Ornamental Iron Co.: *Miscellaneous Steel and Iron Fabrication.*

Birmingham Slag Co.: *Sand and Slag.*

Blaw-Know Co.: *Pulpwood Grapple; Steel Grating.*

Boston Gear Works, Inc.: *Ratio Motors.*

Bowser, Inc.: *Oil Circulating Equipment.*

Brady Conveyor Corp.: *Conveyors.*

Brick and Tile Mfg. Co.: *Brick.*

Bristol Co.: *Instruments.*

Brooks-Fisher Insulation Co.: *Subcontract Tank and Pipe Insulation.*

Brown Instrument Co.: *Instruments and Controls.*

Buffalo Forge Co.: *Drills and Blowers.*

Carborundum Co.: *Stones.*

Ceco Steel Products Co.: *Reinforcing Steel.*

Chicago Bridge and Iron Co.: *Steel Elevated Tank.*

Chicago Pneumatic Tool Co.: *Air Compressors.*

Clark Equipment Co.: *Trucks.*

James B. Clow and Sons: *Cast Iron Pipe and Fittings.*

Combustion Engineering—Super-Heater, Inc.: *Recovery System.*

Connors Steel Co.: *Reinforcing Steel.*

Construction Equipment Co.: *Construction Equipment.*

Crane Co.: *Pipe, Pipe Fittings, etc.*

Crane Engineering Sales, Inc.: *Pumps.*

Cutler-Hammer, Inc.: *Unitrols.*

DeLavel Separator Co.: *Separators.*

DeLavel Steam Turbine Co.: *Steam Turbines; Pumps.*

DeZurik Shower Co.: *Consistency Regulators.*

W. S. Dickey Clay Manufacturing Co.: *Terra Cotta Pipe.*

Dorr Co., Inc.: *Causticizing Equipment.*

Duriron Co., Inc.: *Hydraulic Ejector.*

E. I. Du Pont De Nemours & Co.: *Paint.*

Eastwood Neally Corp.: *Suction Box Conditioners.*

Ellard Contracting Co.: *Sedimentation Basin.*

Emerson Mfg. Co.: *Jordons.*

Engineering Products Co.: *Conveyor and Dollies.*

Esterline Angus & Co.: *Instruments.*

Evans Motor Co.: *Construction Equipment.*

Fairbanks-Morse & Co.: *Scales.*

Falk Corp.: *Reducers-Coupling.*

Farrell-Birmingham Co., Inc.: *Roll Grinder.*

Fibre Making Processes, Inc.: *Turpentine Recovery; Barking Drums; Blow Heat Recovery.*

Fisher Governor Co.: *Instruments.*

Fisher and Porter Co.: *Instruments.*

Foxboro Co.: *Instruments.*

General Electric Co.: *Paper Machine Drives; Motors; Control Equipment.*

General Machinery Co.: *C-H Unitrols; Electrical Equipment.*

Georgia Pacific Plywood Co.: *Form Plywood.*

Goulds Pump, Inc.: *Pumps.*

Graybar Electric Co., Inc.: *Electrical Equipment.*

Hahn Roofing and Heating Co.: *Roofing and installation of Transite Siding.*

Hamilton Mfg. Co.: *Laboratory Equipment.*

Harbison-Walker Refractories: *Brick.*

Harnischfeger Corp.: *Hoists and Cranes.*

Hayes Machine and Manufacturing Co., Inc.: *Roll Truck.*

Hays Corp.: *Instruments.*

Anton Haug.: *Drainers.*

James A. Head & Co.: *Office Furniture and Supplies.*

Helburn Co.: *Cafeteria Equipment.*

Heppenstall Co.: *Chipper Knives.*

Hermann Mfg. Co.: *Disintegrators.*

Improved Paper Machine Corp.: *Washers; Tailing Screens; Agitators; Screening Equipment; Wet End Machine; Bleachery Equipment; Repulper.*

Industrial Piping, Inc.: *Stainless Steel, Valves, Fittings; and Steel Pipe Fabrication.*

Infilco Inc.: *Lime Slaker; Feeder.*

Ingalls Iron Works: *Steel Tanks and miscellaneous Steel Products.*

Ingersoll-Rand Co.: *Air Compressors.*

Jeffrey Mfg. Co.: *Hammer Mill; Conveyors.*

Johns Manville Corp.: *Transite Pipe; Insulation; Fittings; Siding.*

E. D. Jones and Sons Co.: *Broke Disintegrator; Jordons.*

Kalamazoo Tank and Silo Co.: *Tanks.*

C. M. Kemp Mfg. Co.: *Tower Dryers.*

Keystone Engineering Co.: *Core Cutter.*

Keystone Lime Works, Inc.: *Masonry Lime.*

Samuel M. Langston Co.: *Rewinder.*

Leahy Co.: *Instruments.*

Lehigh Portland Cement Co.: *Cement.*

Lehmann Machine Co.: *Lathe.*

Liberty Motors: *Construction Equipment.*

Link Belt Co.: *Conveyor.*

Lithgow Corp.: *Lithcoted Fittings.*

Louis Allis Co.: *Motors.*

Lummus Co.: *Water Heater.*

M & H Equipment Co.: *Material Handlers.*

M & H Valve and Fittings Co.: *Hydrants, Valves and Cast Iron Fittings.*

Magus Metal Corp.: *Screen Plates.*

McVoy-Hausmann Co.: *Milling Machine.*

Manitowac Engineering Works: *Crane.*

Manning, Maxwell & Moore, Inc.: *Hoists.*

Mathews Conveyor Co.: *Pulp Handling Equipment.*

Mec-Tec Control Co.: *Instruments.*

Midwest Fulton Machine Co.: *Vapor Circulating and Steam Control Systems.*

Milton Roy Co.: *Pumps.*

Mixing Equipment Co., Inc.: *Mixer.*

Monarch Elevator and Machine Co.: *Elevator.*

Monarch Machine Tool Co.: *Machine Tools.*

Montague Machine Co.: *Screens.*
Moore Handley Hardware Co.: *Valves, Fittings, Mill Supplies and Electrical Material.*
Modern Machine Co.: *Stock Makers.*
Morgan Construction Co.: *Gas Producer.*
Morris Machine Works: *Pumps.*
D. J. Murray Mfg. Co.: *Chipper.*
Murray Mfg. Co.: *Reactors.*
Nash Engineering Co.: *Pumps.*
National Cast Iron Pipe Division: *Cast Iron Pipe and Fittings.*
National Cement Co.: *Cement.*
National Fireproofing Co.: *Glazed and Structural Tile.*
Neenah Foundry Co.: *Tee-Tite Assemblies and Cast Iron Flanges.*
Nichols Engineering and Research Corp.: *Vortraps.*
Noland Co., Inc.: *Pipe; Pipe Fittings; Plumbing Fixtures; Electrical Supplies.*
North Brothers: *Tank Insulation.*
Northern Engineering Works: *Hoists and Cranes.*
Norton Co.: *Stones.*
Northern Equipment Co.: *Controls.*
Oconee Clay Products Co.: *Terra Cotta Pipe.*
Oliver United Filters, Inc.: *Broke Thickeners; Ground Wood Deckers.*
Orton Crane and Shovel Co.: *Truck Crane.*
Owen Bucket Co.: *Grapples.*
Owen-Richards: *Bearing.*
Oilgear Co.: *Pressure Cylinders.*
Paper Machinery Ltd.: *Flakt Dryer; Slitter and Cutter.*
Patterson-Kelly Co., Inc.: *Heat Exchanger.*
Peerless Supply Co.: *Shop Equipment.*
Permutit Co.: *Controls.*
Pittsburgh Lectrodryer Corp.: *Air Dryer.*
Pittsburgh Plate Glass Co.: *Glazing; Paint.*
Porto Pump, Inc.: *Pumps.*
Raymond Concrete Pile Co.: *Concrete Piler.*
Reliance Electric and Engineering Co.: *Variable Speed Dryer; Pulp Dryer Drive.*
Republic Flow Meter Co.: *Instruments.*
Research Corp.: *Precipitator.*
Richmond Fireproofing Co.: *Automatic Folding Doors.*
Roberts Filter Mfg. Co.: *Water Conditioner.*
J. O. Ross Engineering Co.: *Heating and Ventilating Systems.*
E. H. Sargent and Co.: *Laboratory Equipment.*
Schutte-Koerting Co.: *Eductors and Heaters.*
Shartle Brothers Machine Co.: *Valves.*
E. H. Sheldon & Co.: *Laboratory Equipment.*
Shellenberger-Gregg Co.: *Oil Burner Equipment.*
Orville Simpson Co.: *Chip Screens.*
Sinclair Refining Co.: *Gas, Oil, Grease.*
J. E. Sirrine & Co.: *Consulting Engineer.*
A. O. Smith Corp.: *Digesters.*
Southeastern Sand and Gravel Co.: *Terra Cotta Pipe.*
Southern Cement Co.: *Masonry Cement.*
Southern Scientific Co.: *Laboratory Equipment.*
Standard Steel Spring Co.: *Steel Grating.*
Stebbins Engineering and Mfg. Co.: *Stock Chest; Tile Lining.*
Swenson Evaporator Co.: *Evaporators; Filter.*
Tennessee Coal, Iron and Railroad Co.: *Steel.*
Tractor and Equipment Co.: *Construction Equipment.*
Trimbey Machine Works: *Controls.*
Truscon Steel Co.: *Reinforcing Steel.*
Valley Iron Works Co.: *Headers.*
Valley Sheet Metal Works: *Special Copper Fittings.*
Viking Pump Co.: *Pumps.*
Virginia Bridge Co.: *Structural Steel.*
Virginia Smelting: *S02 System.*
Henry Hogt Machine Co.: *Vaporizer.*
United Conveyor Corp.: *Ash and Dust Removal System.*
United States Pipe and Foundry Co.: *Cast Iron Pipe and Fittings.*
Universal Atlas Cement Co.: *Cement.*
Westinghouse Electric Corp.: *Transformers; Switchgear Equipment.*
Wimberly-Thomas Hardware Co.: *Machine Tools.*
Whiting Corp.: *Cranes.*
Williams and Wilson, Ltd.: *Chip Feeders.*
Worthington Pump and Machinery Corp.: *Pumps.*
Yarnall Waring Co.: *Digester Valves.*
Young and Vann Supply Co.: *Pipe; Steel; Valves; Fittings, and Mill Supplies.*

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Workmen putting the finishing touches on one of several Kalamazoo wood inlet boxes installed at Coosa.

Wherever there's a need for storage tanks and allied equipment to resist water and chemicals with greatest efficiency at lowest cost — there you'll be likely to find Kalamazoo on the job. At Coosa, as at other leading paper mills, engineers selected Kalamazoo — specialists in the construction of wooden head boxes, flumes, troughs, and other custom-built equipment for the paper industry. They needed 43 custom-built head boxes at Coosa, and Kalamazoo supplied all of them.

Another Kalamazoo specialty is the design and construction of glazed tile tanks and similar installations for paper manufacturers. Inquiries for information — without obligation — are welcome.

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COCHRANE CORPORATION 87 YEARS OF SERVICE 1863 - 1950

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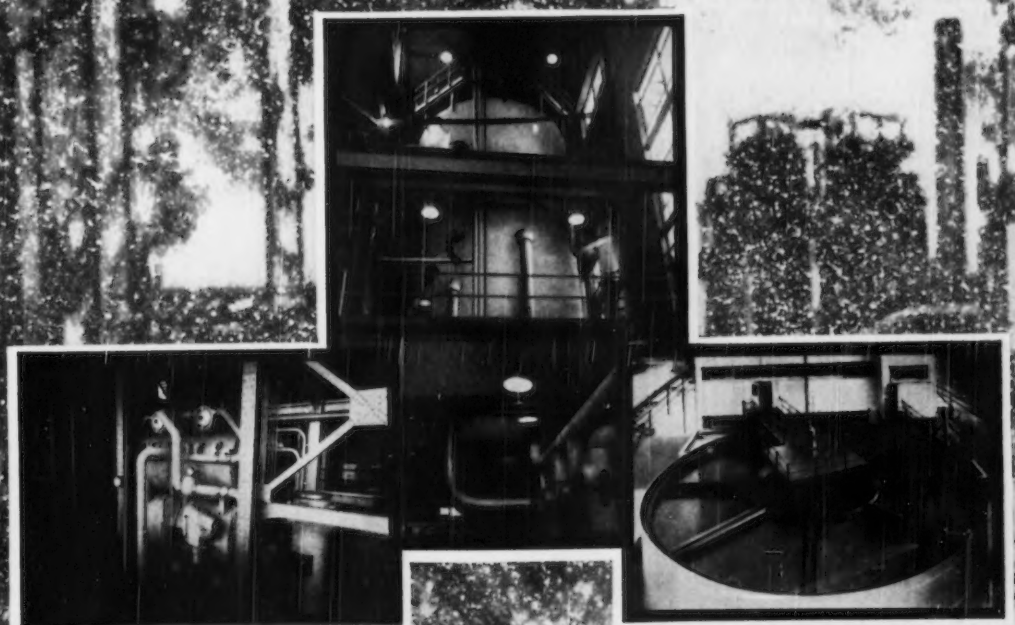


COCHRANE CORPORATION

PHILADELPHIA 32, PA.

In Canada: Canadian General Electric Co., Ltd., Toronto
In Mexico: Babcock & Wilcox de Mexico, S. A., Mexico City
In Europe: Regulateurs Thermique & Epuration, Paris

Fraser Companies, Ltd.

W. A. Ketchen, Chief Chemist

Short History

In the spring of 1873, a group of colonists from Scotland arrived in Saint John, N. B. These colonists proceeded up the St. John River by boat to Kilburn and settled near that village at Kincardine. One of the settlement lots was assigned to Donald Fraser, Sr., one of the colonists.

The year following his arrival, Mr. Fraser produced pit sawn lumber for the local settlers. In the spring of 1875, he leased the small sawmill at River de Chute on the St. John River below Kilburn, where he purchased logs and sold lumber locally. In 1877, Mr. Fraser purchased this mill and then a small mill at Muniac near Kilburn. His products found a ready market in New England, New Brunswick, and Nova Scotia. By 1892, extensive lumbering operations were carried out on lands bordering the Odell River and the Mamazekel River, which were tributaries of the Tobique River.

During the years 1894 to 1902, there was considerable expansion with the acquisition of large blocks of timber lands and limits and the construction of sawmills at Fredericton, N. B.; Baker Brook, N. B.; Plaster Rock, N. B.; and Cabano, Que.

In the year 1905, the Frasers joined with William and Thomas Matheson and A. W. Brebner in further expansion. In 1911, the assets of James Murchie Sons, at Edmundston, were acquired together with timber limits, and further mills were purchased near Fredericton. In 1915, property was acquired on the Miramichi River which included a sawmill at Nelson. The following year, Donald Fraser, Sr., died and his sons Archibald and Donald became president and vice-president, respectively, of the various organizations.

By 1916, arrangements were made to manufacture pulp at Edmundston, and a sulphite mill was constructed for that purpose. The following year, all the varied interests were amalgamated into Fraser Companies, Ltd., a Dominion Company.

Lumbering operations continued to expand with the acquisition of properties on the Restigouche River at Athol, west of Campbellton, N. B. Other properties and mills throughout the province were also acquired, including the limits and mills of the Dominion Pulp Co. on the Miramichi River.

In 1925, it was considered advantageous to manufacture paper at Madawaska, Maine, from pulp produced in the Edmundston mill and further expansion resulted. Three years later, the construction of the pulp mill at Athol began and was operated by the subsidiary Restigouche Co., Ltd.

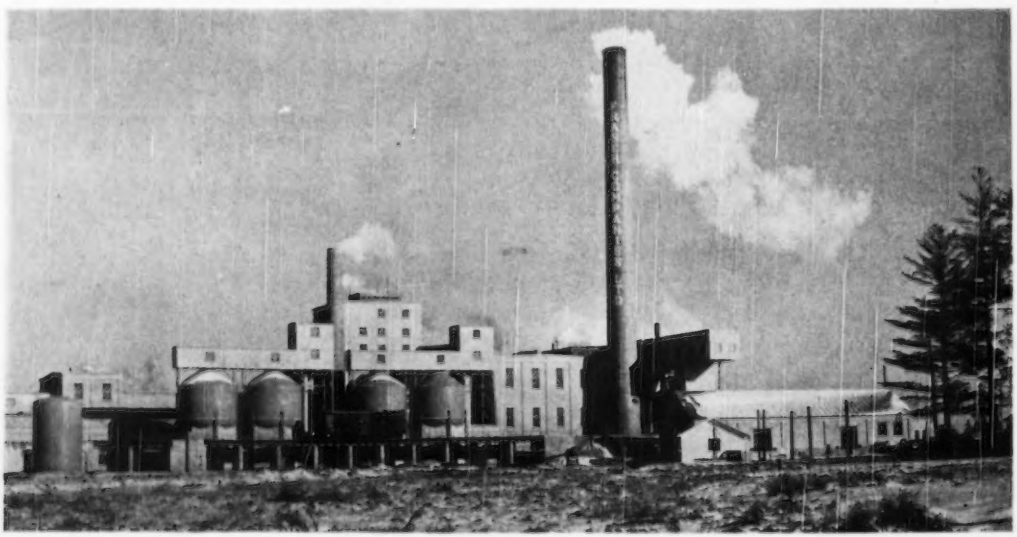
In 1930, K. S. Maclachlan was appointed general manager to supervise the varied interests, particularly those related to pulp and paper.

After Archibald Fraser's death in 1932, K. S. Maclachlan assumed the presidency and continued as general manager until the outbreak of war, when he became Associate Deputy Minister of National Defense.

At this time, Aubrey Crabtree, who was general manager of Fraser Paper, Ltd., where he had been employed since 1930, was appointed vice-president and general manager of Fraser Companies, Ltd., and subsidiaries, and L. M. Sherwood, who had been secretary and treasurer of Fraser Companies, Ltd., and subsidiaries since 1932, was appointed vice-president and controller of the company and subsidiaries. On the resignation of Mr. Maclachlan as president in December of 1940, Aubrey Crabtree was appointed president as well as general manager.

As matter does not remain stationary, further expansion was contemplated and, in 1946, the construction of an unbleached sulphate mill at Newcastle, N. B., was announced. This mill began operations in December of 1949.

Figure 1—General view of Newcastle, N. B. kraft mill.



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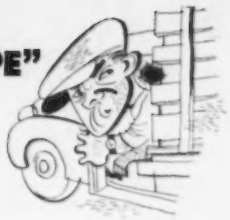

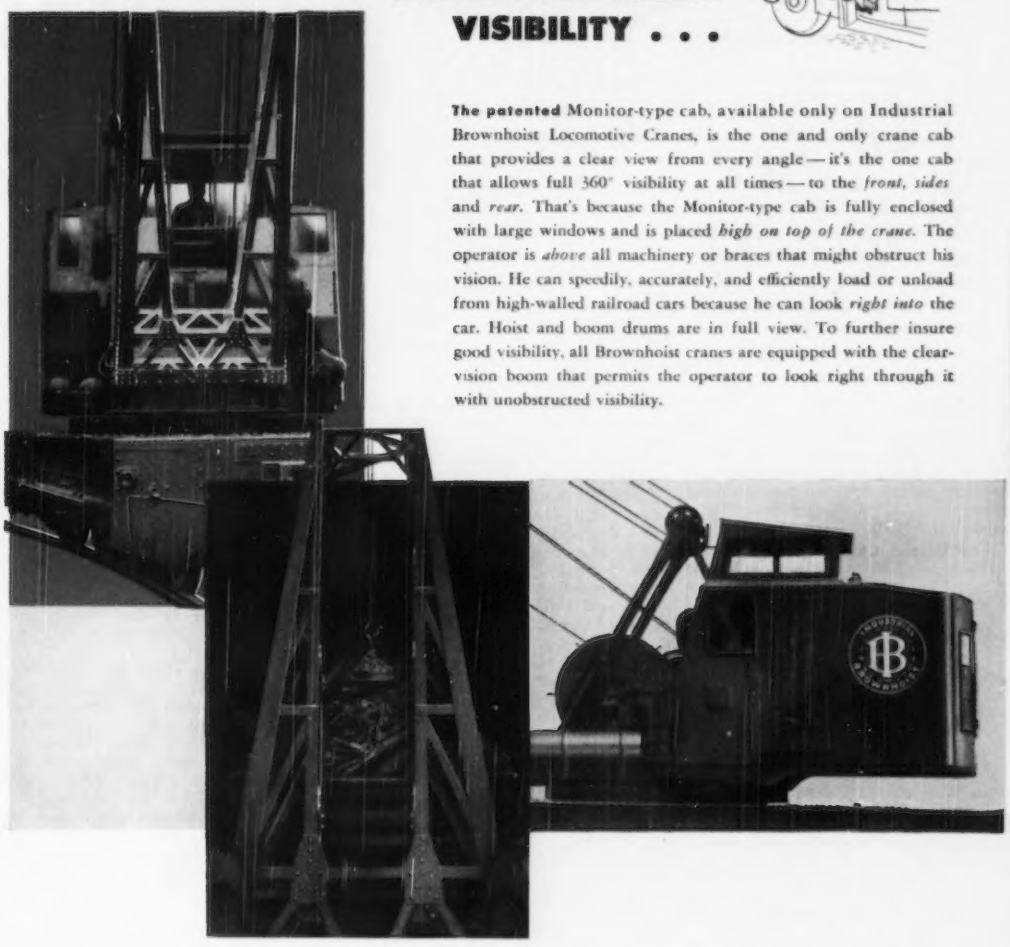

The patented Monitor-type cab, available only on Industrial Brownhoist Locomotive Cranes, is the one and only crane cab that provides a clear view from every angle — it's the one cab that allows full 360° visibility at all times — to the *front, sides* and *rear.* That's because the Monitor-type cab is fully enclosed with large windows and is placed *high on top of the crane.* The operator is *above* all machinery or braces that might obstruct his vision. He can speedily, accurately, and efficiently load or unload from high-walled railroad cars because he can look *right into* the car. Hoist and boom drums are in full view. To further insure good visibility, all Brownhoist cranes are equipped with the clear-vision boom that permits the operator to look right through it with unobstructed visibility.

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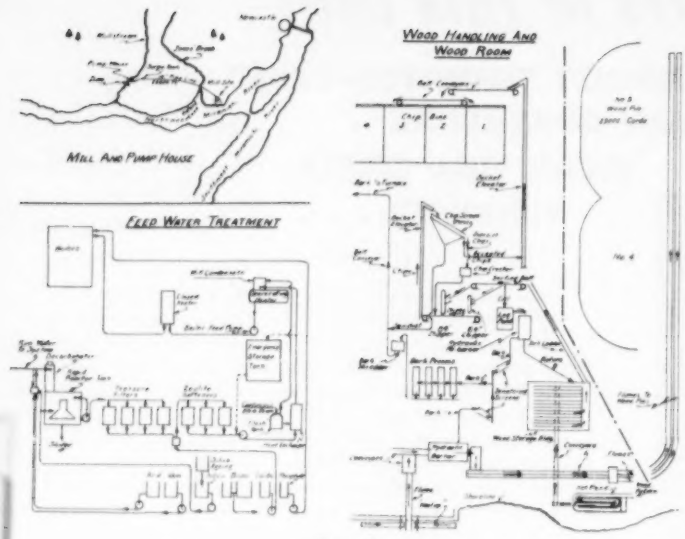

Figure 2

Introduction

Fraser Companies, Ltd., new 120-ton kraft mill is located on the shores of the Northwest Miramichi River at a point just above the junction of the Northwest and Southwest branches at Newcastle, N. B.

The district was first settled by the French and, as early as 1606, there is mention of Miramichi as a well known port for the drying of fish. By the middle of the seventeenth century, Miramichi was the most important of all the French settlements in what is now New Brunswick. Just below the mill lies Beaubears Island where, in the eighteenth century, Charles Deschamps de Boishebert had a camp for Acadian refugees who were making their way to Quebec.

In 1764 the first English speaking settlers came and, by 1800, the district which had been famous for its fish and fur industries was better known for its long lumber. By 1820, the large shipping firms of Pollock, Gilmour & Co. and S. Cunard & Co. had established branches on the Miramichi, and the building of small ships flourished. The next forty years saw extension of the shipbuilding industry and 1000 to 2000 ton square-rigged clippers were being built by several local firms.

When shipbuilding declined, due to the use of the iron ship, the great trade of the Miramichi was again in long lumber. Later, pulpwood and spoolwood were exported in large quantities.

The period 1886 to 1932 saw three pulp mills come into production on the Miramichi River. The first record of a pulp mill began with the construction of a sulphite mill at Chatham in 1886. Unfortunately, the entire mill was destroyed by fire a year later, just as they were ready to start production. The mill was reconstructed and went into production in 1889. The mill flourished and, by 1899, was producing 75 tons of sulphite pulp per day. Two years later, the mill was shut down and was not operated until 1905, when it was incorporated as the Miramichi Pulp and Paper Co. The new company went into liquidation in 1908 and 1909 and, soon afterwards, most of the mill burned.

Construction of the second sulphite mill on the Miramichi had started in 1895. This mill was located on the opposite side of the river and about one mile below Chatham. Originally, the mill was known as the Masterman Sulphite Fibre Co., and it went into production in 1896 making 15 tons of pulp per day. By 1909, the name had been changed to Dominion Pulp Mill and was owned by Albert E. Reed & Co. The Dominion Pulp Mill was expanded to 50 tons per day in 1916 and, four years later, was purchased by Fraser Companies, Ltd., who operated it until 1932. It was later dismantled.

The third mill in the Miramichi district was the New Brunswick Sulphate and Fibre Co., constructed on the southwest Miramichi River at Millerton, about six miles above Newcastle. Construction was started in 1901, and the mill started operations as a kraft pulp and paper mill. In 1914, the mill was largely destroyed by fire. By 1916, the mill had been rebuilt and was purchased by the Howard Smith Paper Mills, Ltd., who operated it until 1921.

Wood

A canal, 90 ft. long by 20 ft. wide, connects the upstream and downstream holding grounds and is the means for conveying wood to the two inclined jack ladders which are mounted back to back with their feed ends below the water level at either end of the canal. Each jack ladder has two chains with a cross angle attachment and is approximately 43 ft. long by 10 ft. wide. They are located close to the north, or mill side, of the canal so that a clear channel of approximately 10 ft. is always available for sluicing logs from the upstream or main holding grounds, to the downstream holding ground. The latter is essential for continuous operation in that it makes possible the handling of wood on the incoming tide. From the jack ladder, the logs drop to the first flume. This flume is 3 ft. wide by 3 ft. high and approximately 190 ft. in length and conveys the logs to the barker building. The flume has approximately a 1½ ft. drop and the sluicing water is continuously recirculated by two 10,000 g.p.m. axial flow pumps.

A short two-chain 4 ft. wide conveyor elevates the logs from the flume to the feed end of the hydraulic barker. The resulting bark is sluiced to a dewatering screen then to a belt conveyor to the wood room where four giant Nekoosa presses, each with a capacity of 7,500 lbs. per hour, remove further water. The bark at this point will still have 60 percent to 65 percent moisture and is conveyed first to a Jeffrey 36″ x 30″ Type A swing hammer shredder, and then to a Hoff

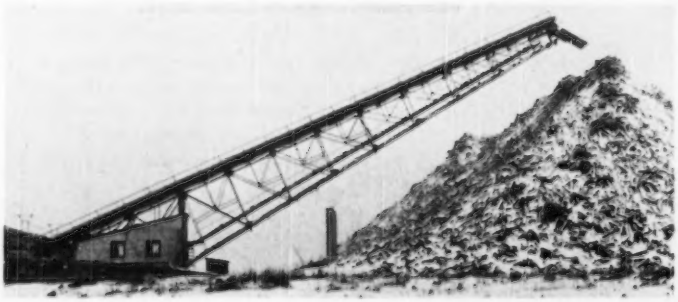

Figure 3—Winter picture of pulpwood stacker and storage pile.

PULP

Perkins-Goodwin Co.

Established 1846

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CHICAGO, ILLINOIS · LUFKIN, TEXAS · STOCKHOLM, SWEDEN

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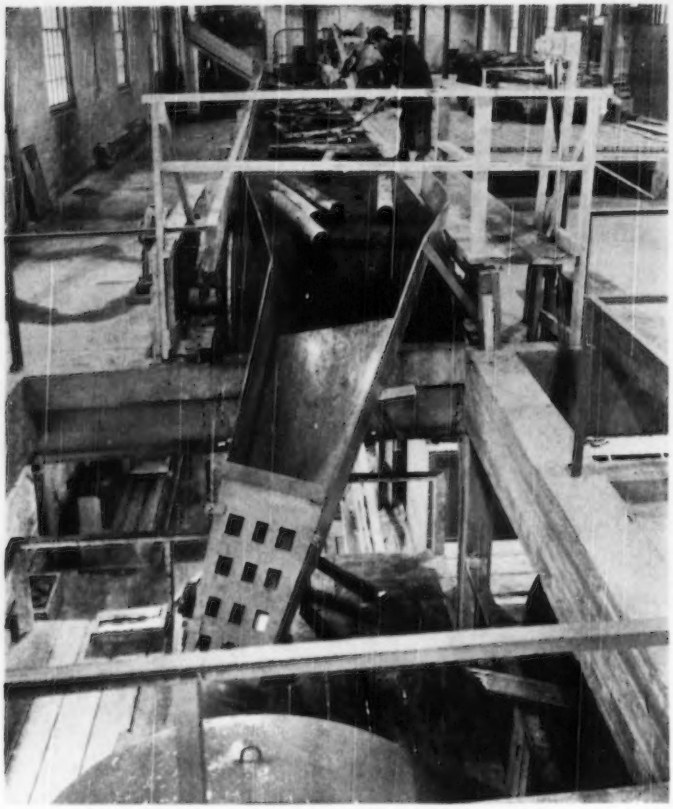


Figure 4—Belt conveyor leading to chipper at bottom of picture.

storage bunker over the auxiliary furnace. It can be fed continuously or intermittently to the furnace from storage. For bark removal, 1,400 g.p.m. of water at 800 lbs. p.s.i. pressure is supplied by a C.I.R. six-stage Cameron pump driven by a Worthington Moore condensing steam turbine and located in the turbine room. The barked logs from the barker are conveyed by a 3½ ft. horizontal belt conveyor to inclined individual chain conveyors. All segregation of wood by species is done in the barker building with the right species being diverted to the proper conveyor. Conveyors No. 6 and No. 7 continue inclined for approximately 332 ft. to an elevation of 46½ ft., and the wood is discharged to two parallel overhead wood stave flumes. The flumes are 1,560 ft. in length and complete the travel of wood to the stackers. A special hopper arrangement discharges the wood from the flumes to the feed end of the stacker and the water drops to the return flume directly below. It is possible, therefore, to supply wood to the stackers and to reclaim wood from the piles to the mill at the same time and with the same water. Each wood pile has a capacity of 25,000 cords of wood. Wood is reclaimed from the piles by underground chain conveyors and fed into the lower flume for sluicing to the hot pond. Water from the hot pond is pumped to the upper flume and returned in the lower flume. A 16 inch wood stave pipe running alongside the lower flume at a lower elevation is available for feeding water into the lower flume. During the period when wood is reclaimed from the log yard, only the pipe line and lower flume is used. The hot pond is essentially a double S channel with the logs and water from the lower flume entering at one end. The water is withdrawn at the other end of the channel and returned to the upper flumes or to the 16 inch pipe line. This forced circulation will convey the logs in the channel and a single chain conveyor, 75 ft. in length, elevates the logs from the hot pond to the single chain inclined conveyor to the wood storage building. This latter conveyor is approximately 130 ft. in length to the south wall of the wood storage building. An arrangement for bypassing stackers is provided and wood may be sent direct from barker to mill storage building. The wood storage building conveyor continues overhead for the full length of the building and is equipped with gates to discharge the wood directly below. The storage capacity of this building is estimated at 300 cords. A three-chain conveyor elevates the wood to the chipping floor of the wood room. A 5 ft. wide sorting belt conveys the logs to the chippers. Any wood requiring rebarking is manually pulled off the sorting table onto a belt conveyor and sluiced to the small hydraulic rebarker and returned to the system. The resulting bark is dewatered and pressed as previously described.

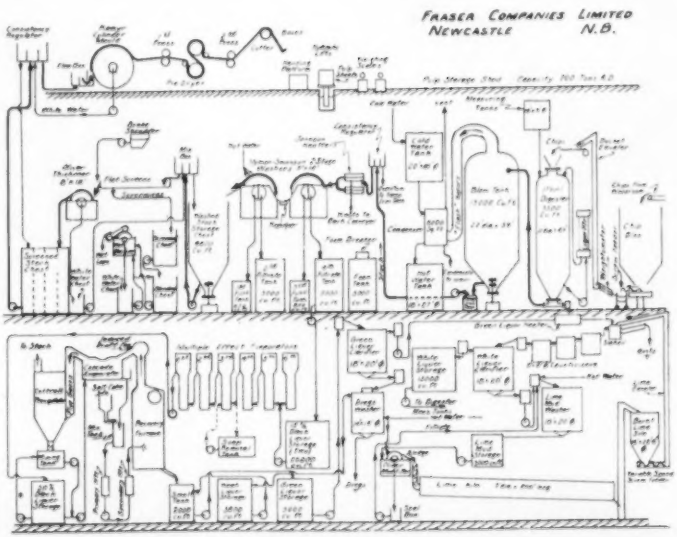
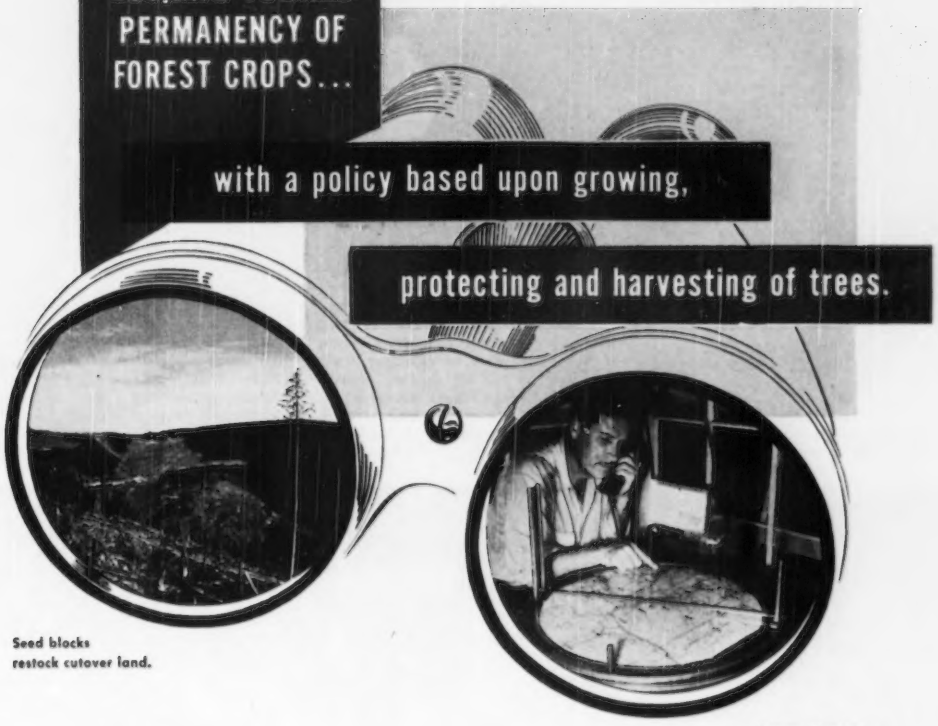


Figure 5

LOOKING TOWARD PERMANENCY OF FOREST CROPS...

with a policy based upon growing,

protecting and harvesting of trees.



Seed blocks restock cutover land.

Spotter plotting a fire location.

THE WEYERHAEUSER forestry policy is based upon the *planned* growing, protecting and harvesting of trees . . . looking toward permanency and more complete utilization of the forest crop.

The Pulp Division, Weyerhaeuser Timber Company, derives much of its wood supply from pre-logging which takes out small trees that may be damaged in falling large ones . . . and re-logging which utilizes the left-over chunks and slabs. Using these advanced "harvesting techniques" plus hydraulic barking of logs, Weyerhaeuser mills are utilizing the forest crops more completely than ever before, insuring the reliability of the Pulp Division as a continuing source of supply.

PULP DIVISION

WEYERHAEUSER

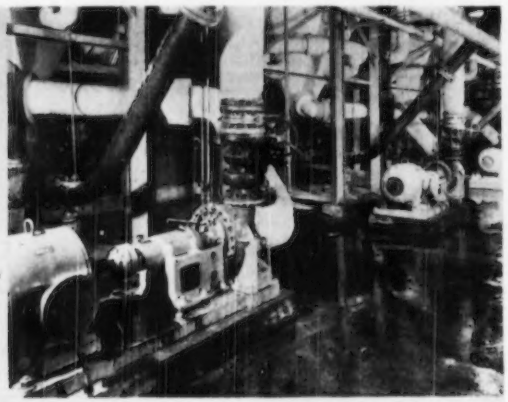
Two Carthage 10-knife chippers, one 64" and one 84", right hand 16 inch spout with a total capacity of 50 cords per hour, are installed. From the chipper, the chips are elevated by bucket conveyor to two Dillon, 6 ft. by 14 ft. shaker type, chip screens. The sawdust is conveyed to the bark conveyor for burning and the oversized chips are passed through a Waterous swing hammer crusher and returned ahead of the screens. The accepted chips are raised by bucket elevator to belt conveyors over the top of four chip bins. Each bin has an approximate capacity of 30 cords, or two digester charges, and a Williams & Wilson twin screw self-propelled chip feeder removes the chips from the bin and conveys them to a short inclined belt conveyor. On this latter conveyor, the chips are weighed automatically before being fed to a bucket elevator which delivers the chips to the belt conveyors feeding the individual hoppers over the digesters.

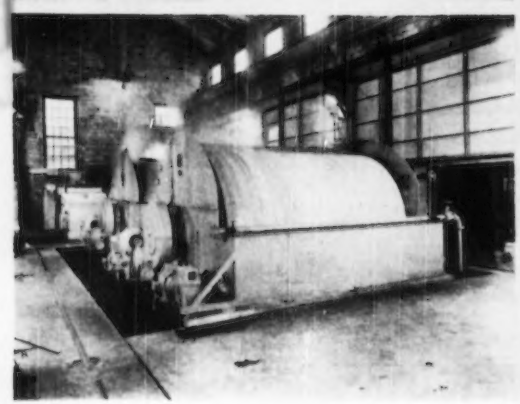
Pulp

Two liquor measuring tanks and one spare on the floor above the digesters are automatically filled and emptied to the digester. There are four digesters, each 11 ft. inside diameter by 47 ft. high and of 3,500 cu. ft. capacity, yielding approximately 7.5 tons air dry of unbleached pulp. Each digester is equipped with heat exchangers for indirect cooking and circulating pumps. The liquor is drawn out of the bottom cone of the digester and returned to the top at the rate of 2,000 g.p.m. Bypass piping has been provided so as to continue circulation with direct cooking and to introduce direct steam through four nozzles positioned symmetrically around the bottom cone. The digester features complete automatic cooking controls, a separator for turpentine, Yarway motor-driven blow valves and a conductivity system for determining contamination of condensate returned to the boiler house. The digester heat exchangers are two-pass equipped with 130, 1¼" No. 16 B.W.G., type 304 stainless steel tubes, each 15 ft. long with an effective heating surface of 637 sq. ft. per heater. The blow tank into which the digesters discharge is 22 ft. inside diameter by 59 ft. high and equipped with an agitator fitted with a Thermoverter unit for automatic consistency control. A Swenson blow heat recovery system, consisting of a 6,000 sq. ft. surface condenser, recovers the heat in the vapors flashed from the blow tank. Automatic temperature controls regulate the flow of cold fresh water from an overhead 20 ft. diameter by 18 ft. high tank through the condenser to an 18 ft. diameter by 27½ ft. high hot water storage tank.

The resulting hot water is used for pulp washing, causticizing, and at the Kamyr pulp machine. To assure a flow of hot water at a uniform temperature, a temperature controlled heat exchanger utilizing low pressure steam, has been located after the hot water storage tank.

The consistency controlled stock from the blow tank passes through a 6 ft. diameter by 6 ft. high tramp iron collector tank and is pumped to a Waterous consistency regulator for further dilution with black liquor, and then to two Jonsson knotters in parallel ahead of the Swenson black liquor washing system. An overflow line returns stock from the regulator to the tramp iron collector tank. The washing system consists of two 9 ft. by 12





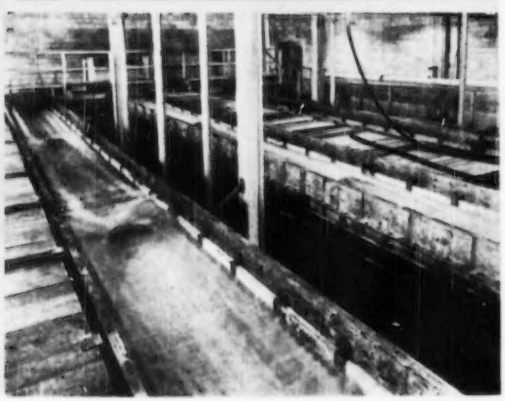
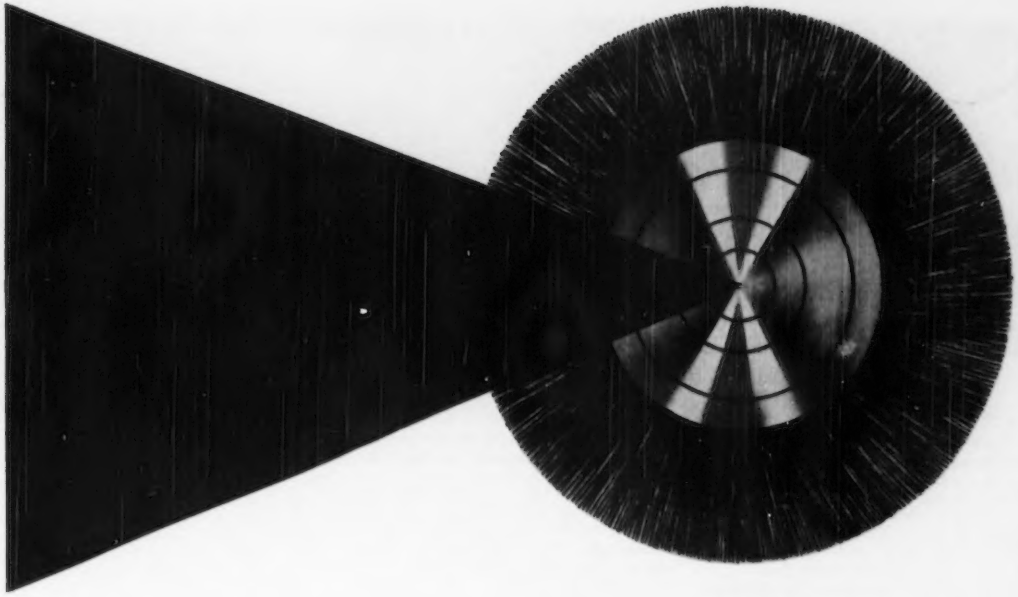


Figure 6—Upper left—Digester Operating Floor. Spouts lead from overhead chipper bins. Figure 7—Upper right—Digester cone bottoms showing ring of steam connections, circulating lines and pumps and uninsulated blow lines. Figure 8—Lower left—Two Swenson-Nyman 9x12 vacuum washers. Jansson Knotters (not visible in picture) are behind the washers. Figure 9—Lower right—Three lines of primary flat screens and one line of tailing screens for unbleached pulp.



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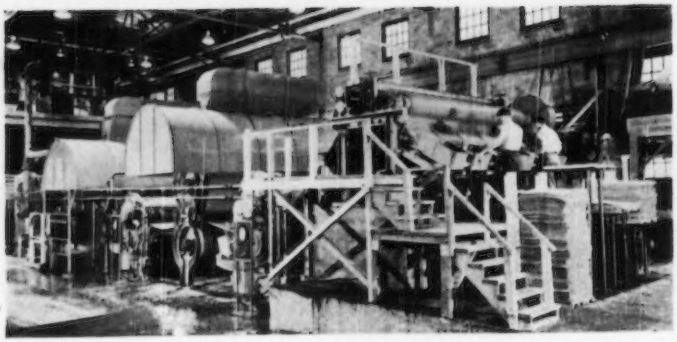


Figure 10—Kamyr cylinder wet machine with pulp slitter and sheet cutter.

ft. Swenson-Nyman two-stage washers. There are four filtrate tanks, one for each stage, and the last stage has a level controller with the excess black liquor being pumped to two 13,000 cu. ft. storage tanks. The first and third stage filtrate tanks have a capacity of 850 cu. ft. each, and the second and fourth stage filtrate tanks have a capacity of 5,000 cu. ft. each. In addition, vent lines from each of the filtrate tanks are connected to the same 5,000 cu. ft. foam tank equipped with a Sherbrooke foam breaker. Suction at the washers is maintained by an L-8 Nash Hytor vacuum pump, equipped with an entrainment tower between washers and pump. Washed pulp from the last washer drops to the washed stock storage chest. This is a steel tank with a cone shaped bottom and fitted at the bottom with an agitator. An automatic consistency controller will maintain constant consistency of stock removed. From this chest, the stock is pumped to the screen room headbox for dilution and flow control and then over three lines of standard 14 Smythe flat screens with bronze vat. The rejects pass over a fourth line of screens and the tailings from this screen are sluiced to a 14 ft. diameter by 13 ft. high tile screenings chest. Each line is made up of three 14 plate sections. The plate slots are .010", .012", and .014". From the tile chest, the screenings are pumped intermittently to a 12 ft. diameter by 13 ft. high tile blending chest and, from this, to a Waterous wet machine. A 5 ft. diameter by 13 ft. high tile tank for white water from the wet machine completes the screenings system.

For final washing and thickening, the accepted pulp from the flat screens is conducted by wooden spout to an Oliver vacuum type ring valve filter, 8 ft. diameter by 12 ft. face. The washed stock drops to the screened stock storage chest below the washer. This is a tile-lined four-compartment chest, and stock at 3½ percent consistency will be pumped from the chest to a Waterous consistency regulator ahead of the 136" trim P. M. I.. Kamyr cylinder wet machine. The Kamyr machine is equipped with felt-less first and second presses. The cylinder mould as well as presses are equipped with pneumatic loading. Between the first and second press is one set of predrier cylinders, in which the steam is pressure controlled. The machine is further equipped with a 125 horsepower D. C. adjustable speed motor providing constant torque from 86 to 700 r.p.m., and a standard pulp cutter and slitter. The sheets of pulp will be manually lifted from the boxes and built up into skid loads. A gas-powered fork lift truck, 3,000 lb. load capacity will convey the skid loads to a platform scale and from the scale either to storage or to freight cars. Effective storage area, one skid high, is estimated at 700 tons of air dry pulp.

Recovery and Chemicals

Thin black liquor (15 percent solids) is pumped from storage to a John Inglis six body sextuple effect evaporator system and leaves the system at approximately 50 percent solids. Each evaporator is equipped with 240 two-inch No. 10 B.W.G. tubes 24 ft. long, with the exception of the first effect evaporator where there are 258 two-inch No. 16 B.W.G. stainless steel tubes. Each evaporator has an effective heating surface of 2,800 sq. ft. Steam to the first effect is pressure controlled and the flow recorded. Thin black liquor is split-fed and flow controlled to the fifth and sixth effects. The Beaumé of the black liquor in and out of the system is automatically recorded. A skimming system with a soap removal tank has been installed between the third and fourth effects. On the vapor side, leaving the last effect, there is a "catchall" tank, surface condenser, precooler, intercondenser, and two steam syphons, respectively. The heavy black liquor leaving the first effect is pumped from a flash tank to two steel storage tanks, each with a capacity of approximately 2,500 cu. ft., and located in the recovery building.

The recovery furnace is a Combustion Engineer, 50,000 lbs. per hour, steam unit equipped with superheater. It will generate steam at 600 lbs. p.s.i. pressure, and at 750°F. The hot flue gases from the furnace proper pass through Cascade evaporators countercurrent to heavy black liquor

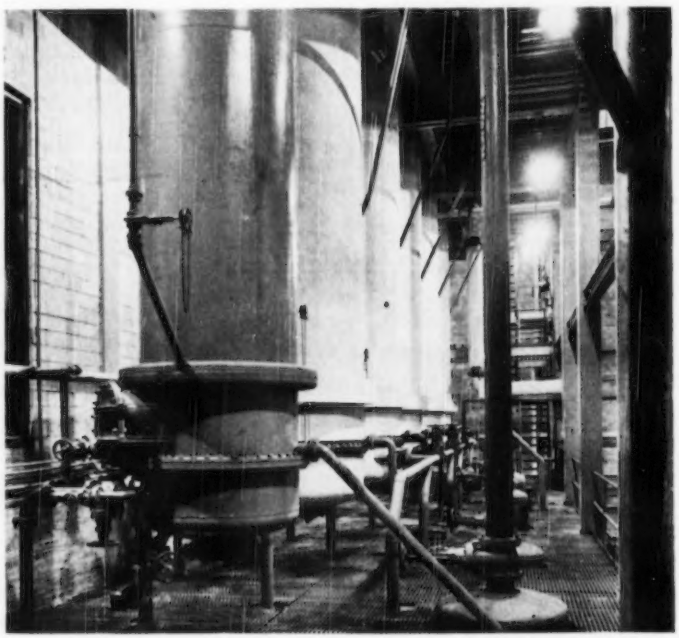
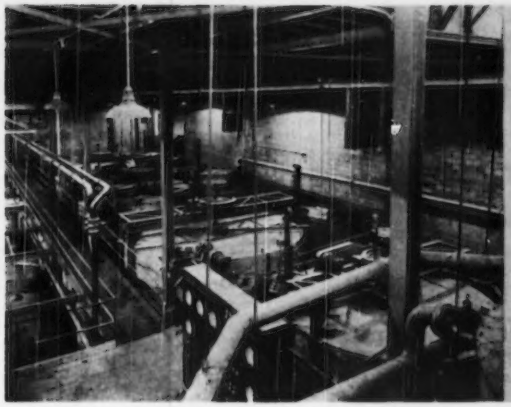


Figure 11—John Ingles six-body sextuple effect evaporator system.



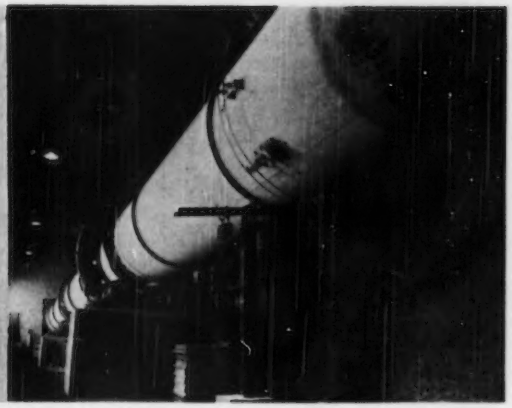


Figure 12—At left—Upper platform in causticizing building. At left units of Dorr continuous causticizing system. Control panel in center. Figure 13—At right—Traylor lime kiln, seven feet in diameter by 200 feet long. Temperature recorder trolley connections in foreground.

from the storage tanks, and then through a Cottrell electrical precipitator to remove suspended matter from the flue gases. The precipitator is made up of three units and has a capacity of 60,000 c.f.m. At this capacity, 90 percent to 95 percent of the suspended matter, largely sodium salts, will settle out. A hopper arrangement and screw conveyor below the precipitator conveys the collected solid material to a small solution tank where heavy black liquor from storage is used to dissolve the chemicals. This enriched black liquor is pumped to the Cascade evaporators along with other black liquor from storage.

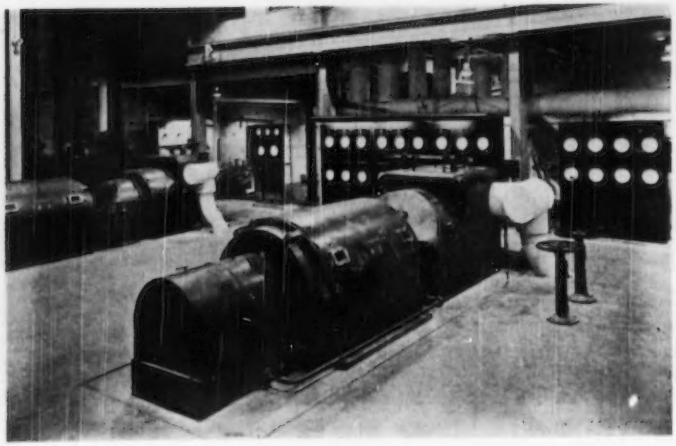
Salt cake is stored in two 750-ton storage silos outside the mill buildings and is elevated intermittently by conveyor to the 4½ ft. diameter by 11½ ft. high salt cake storage tank in the recovery building. From this latter storage, it is fed continuously by controlled screw conveyor to the salt cake mix tank, where it is put in solution with heavy black liquor from the Cascade evaporators. The resulting black liquor will have a total solids content of 65 percent to 70 percent and is pumped continuously through a primary and secondary liquor heater to two nozzles into the furnace proper and burned. The molten slag leaves the furnace hearth through a spout and falls into a tank to which there is continually added weak liquor. Automatic controls regulate the flow of green liquor from the smelt tank to the green liquor storage tank, as well as the flow of weak liquor to the smelt tank.

The green liquor storage tank, with a capacity of approximately 5,000 cu. ft., is housed in the causticizing building, and is part of the Dorr continuous causticizing system. Green liquor is pumped at a controlled continuous rate to a three-tray four-compartment green liquor clarifier, 18 ft. diameter by 20 ft. high. The sludge from this clarifier is diluted with fresh water and pumped to a two-tray three-compartment dregs washer, 14 ft. diameter by 16 ft. high. The dregs from the bottom of this washer are pumped out and sluiced to sewer. The clear liquor overflow from the top compartment is used as wash water farther on in the system. Returning to the green liquor clarifier, the clear overflow from each compartment is pumped to a No. 6 Dorrco lime slaker to which is also added a continuous measured amount of burnt lime. A 200 sq. ft. spiral type heat exchanger utilizing low pressure steam is installed in the liquor line between clarifier and slaker to maintain the temperature of the liquor to the slaker constant. Large undissolved particles are continuously discharged from the slaker. The lime and green liquor slurry overflows from the slaker through three 9 ft. diameter by 9 ft. high Dorrco causticizers in series to the three-tray, four-compartment Dorr white liquor clarifier, 18 ft. diameter by 20 ft. high. The clear liquor overflow from each compartment is pumped to the white liquor storage tank, with a capacity of 13,000 cu. ft., and located in the evaporator room. This is the finished liquor which will be pumped intermittently to the digester measuring tank for cooking. The sludge from the bottom of the white liquor clarifier will be diluted with the clear overflow from the dregs washer, additional fresh hot water and filtrate from the Oliver mud filter, before being fed to the three-tray four-compartment Dorr lime mud washer, 18 ft. diameter by 20 ft. high. The clear overflow from this washer is pumped to the weak liquor storage tank to be used continuously in the smelt or dissolving tank. The sludge from the bottom of the washer is pumped to the lime mud storage mixer tank, 15 ft. diameter by 15 ft. high, where it is diluted with additional hot wash water and the resulting slurry is pumped to a 6 ft. diameter by 4 ft. face Oliver vacuum type mud filter. The filtrate is returned to the Dorr lime mud washer, as noted above, and the thickened sludge is fed by screw conveyor to the feed end of the lime kiln. A Nash L-6 Hytor vacuum pump acting through a spray trap and vacuum receiver creates the necessary suction at the filter.

A Traylor Engineering, 7 ft. diameter by 200 ft. long rotary kiln completes the causticizing equipment. The kiln is fired with Bunker "C" oil and the hot burnt lime drops out at the firing end to a water-jacketted conveyor for cooling before being elevated and stored in the steel lime silo 16 ft. diameter by 22½ ft. high. From the bottom of the silo, the lime is conveyed at a continuous controlled rate by means of screw and bucket conveyors to the lime slaker. Three-quarter inch limestone is purchased and stored in two 750-ton storage silos and conveyed to the feed end of the lime kiln. This limestone may be fed at a steady rate along with the sludge, or calcined separately. The kiln is equipped with fully automatic combustion controls, an auxiliary gasoline engine drive, and a wet scrubber for recovering solids from the flue gases.

Water

Fresh process water is obtained from the North West Millstream, where a dam was constructed and a pump house filter plant located. The dam has a sluice gate and a high and low spillway. Raw water is pumped to six 15 ft. by 15 ft. gravity sand filters in parallel, and the filtered water is stored in two clearwells directly below the filters. An additional pump is provided for backwashing the filters. A 2,500 g.p.m. pump is provided for pumping the filtered water to the mill and an auxiliary 2,500 g.p.m. gasoline engine driven pump is so located to pump either raw or filtered water direct to the mill. A 16" inside diameter wood stave line, 3,500 ft. in length, delivers water to the surge tank. The surge tank, located at the top of the hill, is of reinforced concrete construction, 10 ft. x 8 ft. x 100 ft., and provided with an overflow and piping



Westinghouse 2500 K.W. extraction turbine in foreground. Westinghouse 2000 K.W. condensing turbine at left rear.

to return the water to the pond. To the overflow level, the surge tank capacity is approximately 4,060 cu. ft. and the elevation at this point is approximately 165 ft. above the pump house floor. From the surge tank to the mill, there is a drop of 183 ft. and the water will flow by gravity through 19,300 ft. of 16" pipe. Of the 22,800 ft. of 16" pipe, only 900 ft. is cast iron.

Raw water, approximately 60 g.p.m., is required for steam generation. Sulphuric acid, alum and silica are fed continuously from make-up and storage tanks, located in the feed water building, to the raw water ahead of a decarbonator tank directly above the rapid reactor tank. Additional silica can be added direct to the rapid reactor. The rate of flow of raw water through the decarbonator is regulated by a mechanical float control in the rapid reactor tank. From this tank, a booster pump delivers water to the top of four strainer type 3,600 gallons per hour pressure sand filters in parallel, ahead of three 7,500 gallons per hour Zeolite softeners in parallel. Weak caustic soda solution is introduced between the filters and softener tanks. Piping has been so arranged as to make possible the by-passing of the filters and softeners. From the softeners, the water is pumped through a heat exchanger, utilizing the heat in the continuous blow-down, and then to the deaerating heater, where mill condensate and low pressure flash steam are picked up. In parallel with the latter heater is a 2,000 cu. ft. storage tank with by-pass piping and mechanical float control to assure two hours' supply of treated water for boilers at all times. From the deaerating heater, the boiler feed drops by gravity to the boiler feed pumps, one of which is a 400 g.p.m. Terry steam-driven turbine, and pumped through a closed heat exchanger to both auxiliary and recovery boilers. The closed heater utilizes 140 lbs. p.s.i. steam, the flow of which is controlled by a temperature bulb in the feed water line to the boiler. Sodium metaphosphate for controlling scaling in the boiler is added directly to the boilers from the make-up tank. Other related equipment not mentioned above is a small silica aging tank located on the floor above the silica measuring tank, and the mill condensate receiving tank. This latter tank is 5 ft. in diameter and 10 ft. in length. A mechanical float control regulates the flow to the deaerating heater. In addition, the tank is equipped with a 5" regulating overflow valve and a 3" relief valve.

Miscellaneous

Power will be generated from high pressure steam by a 2,000 K.W. Westinghouse condensing turbine and a 2,500 K.W. Westinghouse extracting and exhausting turbine. Extracted steam at 140 lbs. p.s.i. will be used at the digesters and a steam accumulator, with a capacity of 14,000 lbs., is in parallel with the digester line to assure uniform operation of the turbine. Exhausted steam at 40 lbs. p.s.i. from the same turbine and steam from the accumulator will be used as process and heating steam in the mill.

A 36" wood stave salt water intake pipe, 220 ft. long, runs out from the salt water pump house located at the river's edge into the stream to a point about 6 ft. from the nearest pier. At this point, the intake is about 6 ft. below low tide level. A Link Belt vertical traveling water screen, model No. 45, with trays 7 ft. wide and a capacity of 15,000 g.p.m., located in the salt water pump house removes large particles. An L-shaped channel, 17 ft. deep, on two sides of the building acts as a head tank. Two Cameron 2,500 g.p.m., 290 ft. head pumps, driven by 250 h.p. motors supply water to the fire mains. Two Cameron 3,500 g.p.m., 90 ft. head pumps, driven by 100 h.p. motors supply salt water to the mill for condensing at turbine, turbine pump, evaporator, and clean-up purposes.

The laboratory is divided into two main sections: A dry or analytical laboratory for the preparation of mill testing solutions and the analysis of raw materials, water, and special testing, and a wet or pulp testing laboratory for the preparing and testing of pulp, chips, bark, etc. A chemicals storage room, clerical office, and charts room complete the laboratory. An instrument repair and storage room has been provided and this is adjacent to the laboratory.

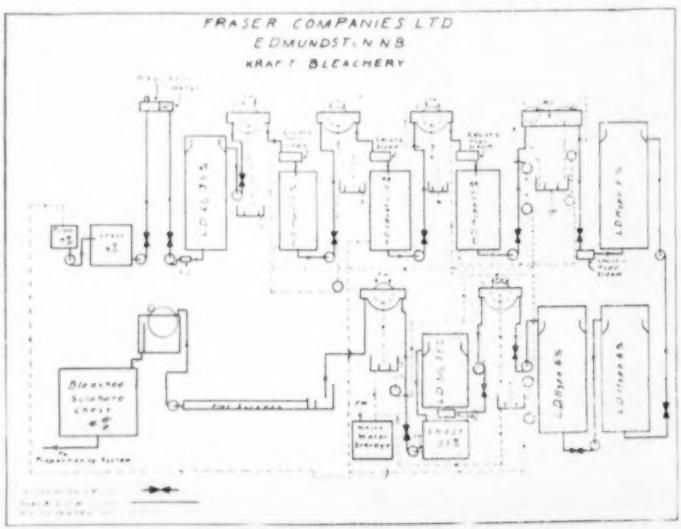
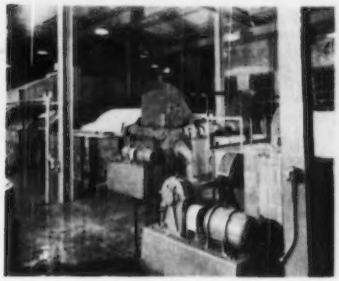


Figure 15

A well equipped machine shop with separate rooms for woodworking shop, electrical shop, and blacksmith and welding shop has been provided in a connecting building and adjacent to the mill stores.

The office building will house the clerical staff, as well as all woods department personnel and a first aid room. Below the office, are located the employe locker room, shower, and wash rooms, as well as a file storage room. A lunch room has been located in the mill building.

Housing is provided for some members of the mill and woods operating staff. This consists of two units of two houses each, one unit of three houses, and one single house unit. In addition, a Staff House, with private quarters and sufficient rooms for eleven persons, has been built. All buildings are located near the mill in a semi-circle with a common driveway at the front.



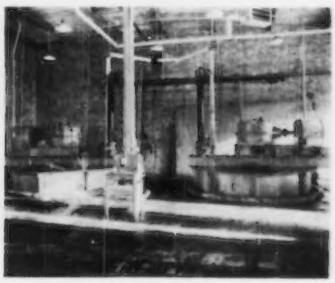


Figure 16—Valley pulpers at Edmundston, N. B. bleach plant at left. Figure 17—Vacuum washers in Edmundston bleach plant at right.

Sulphate Pulp Bleaching Plant at Edmundston, N.B.

For bleaching sulphate pulp manufactured at its new mill at Newcastle, N. B., Fraser Companies, Ltd., have designed and built a modern and compact bleaching plant at Edmundston, N. B.

The plant is designed for bleaching at a normal rate of 120 tons of unbleached fibre per day, carrying out the usual four functions, chlorination, extraction, brightness development and brightness stabilization. The building is a steel frame structure having brick walls with an inside course of tile. The floors are all reinforced concrete and the bleaching towers are of reinforced concrete lined with tile.

Unbleached kraft pulp is delivered to the bleachery by railroad from the Newcastle plant in 1800 lb. skids at approximately 55 percent moisture. The pulp is fed by conveyor to two 1400 lb. capacity pulpers. It is pulped to a 4 percent consistency and passes to a stock chest of 5.7 tons capacity. The raw stock is pumped from this chest to a consistency regulator on the top floor (the operating floor) of the bleachery building where it is adjusted to 3.5 percent consistency and is metered to the chlorination stage by a Stock Meter.

Bleaching

Chlorine is metered into the unbleached stock by means of a liquid chlorine rotameter and control valve, entering through a line-mixer at the base of the chlorinating tower. The chlorinating tower is tile-lined equipped with central agitator.

The stock then passes to the three high density stages. The three stages have almost identical equipment, each consisting of a tile-lined tower over which there is located a high density washer dropping stock at 15 percent into the tower through a mixer. High pressure water nozzles at the base of each tower dilute the stock before pumping. In the first tower, hypochlorite and caustic are added at the mixer, in the second, caustic, and in the third, hypochlorite and caustic. Automatically controlled steam is introduced at the mixers before each tower to keep the stock at the required temperature.

From the last high density tower (the second hypochlorite stage) the stock is pumped to a double cylinder decker-type washer and thickener where it is thickened to 6 percent consistency. To this thickened stock, controlled steam is added, and it is pumped through a line mixer, where hypochlorite and caustic are added, to the base of the first low density bleaching tower. There are three such towers, each tile-lined and equipped with central agitator. Stock pumped into the bottom, overflows out the top and is pumped into the base of the next tower. In each tower, hypochlorite and caustic may be added to bring the stock to the required brightness.

From the last low density tower, the stock is pumped to another washer, thickened to 3.5 percent and pumped through a line mixer into the base of a small agitated reaction tower, where it is stabilized with SO_2 introduced in solution at the pump. The SO_2 addition is controlled by a pH controller. Stock overflowing from this tower is pumped to a sixth washer and then flows by gravity to the screens.

Screening

Smythe flat screens are used for the final screening. There are three lines of three sections for primary screening and a tailing line of two sections. Chrome plated plates of 0.008" and 0.007" cut are used. Accepted stock from the screens is pumped to three deckers, thickened to 4.0 percent and dropped into a storage chest of 12 to 15 tons capacity.

Proportioning System

Located beside the bleached sulphate storage chest just mentioned, is a bleached sulphite storage chest of the same size. The consistency of the stock from each chest is regulated to 3.5 percent by separate consistency regulators before being pumped through a Ratosleeve and a ratio controller to this blending box. Similarly the bleached kraft is pumped through a Ratosleeve and a ratio controller to the same blending box.

From the blending box, bleached pulp in any ratio of sulphite to kraft may be delivered to the paper mill. There are also lines taken off before the blend box so that either of the unmixed stocks may be pumped separately to the board machine or the paper mill.

Instrumentation and Stock Flow Control

Most stock and water valves are Saunders type and are operated by Foxboro air cylinder positioners remotely controlled from a single console on the operating floor. Control buttons for most of the pump motors are located on the same console.

The plant is almost completely instrumented. Nearly all the instruments are mounted on a single panel beside the console on the operating floor. Temperatures in all tanks and towers are automatically controlled and recorded. Stock levels in the unbleached storage tanks, bleached storage chests, white water chests and high density towers are recorded. The pH is measured and recorded after each stage and the pH in the SO_2 reaction tower is controlled and recorded. All these instruments are located on the panel previously mentioned. A second panel on a lower floor records steam and water usage and effluent sewer flow going through a Parshall flume.

Storage of Pulp

A pulp storage building having approximately 10,000 sq. ft. of floor space has been added. This is used for the

incoming unbleached pulp. A covered train shed has been built to accommodate incoming pulp shipments. Car unloading is carried out by electric fork trucks.

Steam and Power

Low pressure steam is provided by the present steam plant. To increase the supply of power, a 3750 K.V.A. Westinghouse extracting, condensing turbine has been installed, of whose output approximately 1200 K.V.A. is used in operating the bleachery.

Corrosion Control

All chests, towers and washer vats have been tile lined. All pumps, agitators and mixers are rubber lined. Wherever possible, all metal frame work has been flame cleaned and protected with Valdura rubber base paint. All pipes are lithcoated or rubber lined.

List of Suppliers

Accumulators, Foster Wheeler Ltd.

Agitators, Sherbrooke Machineries Ltd.

Auxiliary Boilers, Combustion Engineering Corp., Ltd.

Bark Presses & Drainer, Hydraulic Machinery Co., Ltd.

Blow Heat Condenser, Whiting Corp. (Canada) Ltd.

Blow Tank, Dominion Bridge Co., Ltd.

Brick and Tile, Citadel Brick Ltd.

Building Construction, E. G. M. Cape and Co.

Causticizing System, Dorr Co. (Incorporated)

Chip Feeders, Williams & Wilson, Ltd.

Chip Screens, Thomas A. Dillon.

Chipper, Carthage Machine Co.

Consistency Control, Control Equipment Corp.

Construction, Foundation Maritime Ltd.

Controls (Stock Flow Control and Remote Control Console), Foxboro Co. and Peacock Bros.

Conveyors and Elevators, Jeffrey Manufacturing Co., Ltd.; Link Belt Ltd.; Stephens-Adamson Manufacturing Co. of Canada Ltd.; and United Steel Corp., Ltd.

Digesters, Dominion Bridge Co., Ltd.

Electrical Installation Canadian Westinghouse Co., Ltd.; Canadian General Electric Co., Ltd.; and Reliance Electric and Engineering Co.

Electrical Installation A. J. F. Montabone and A. D. Ross Co.

Electrical Switching, Canadian Westinghouse Co. Ltd.

Equipment Installation, Foundation Maritime Ltd.

Evaporators, John Inglis Co., Ltd.

Feed Water Treatment, Canadian General Electric Co. Ltd.

Flume & Wood Stave Piping, Pacific Coast Pipe Co., Ltd.

Heating & Ventilating, Engineering Installations Ltd. and Ross Engineering of Canada, Ltd.

Instruments, Bailey Meter Co., Ltd.; Bristol Co. of Canada, Ltd.; Fischer & Porter Co., Ltd.; and Leeds & Northrup Co.

Instruments, Peacock Brother, Ltd.

Insulation, Canadian Asbestos Co.

Kamyr Wet Machine, Paper Machinery Ltd.

Lime Kiln, The Canadian Traylor Engr. and Mfg. Co., Ltd.

Lithcoting, R. F. Walsh Co., Ltd.

Mixers, Sherbrooke Machineries, Ltd.

Passenger Elevators, Darling Brothers, Ltd.

Piping and Valves, Crane Ltd.; Grinnell Co. of Canada, Ltd.; James Robertson Co., Ltd.; T. McAvity & Sons, Ltd.; and R. F. Walsh Co., Ltd.

Precipitator, Precipitation Co. of Canada, Ltd.

Pumps, Bingham Pump Co.; Canada Pumps, Ltd.; Canadian Allis-Chalmers, Ltd.; Canadian Ingersoll-Rand Co., Ltd.; Northern Foundry and Machine Co., Ltd.; and Worthington Pump & Machinery Corp.

Recovery Furnace, Combustion Engineering Corp., Ltd.

Repulpers, Valley Iron Works.

Rubber Lined Pipe and Fittings, Dominion Rubber Co., Ltd.; and B. F. Goodrich Rubber Co.

Scales, Canadian Fairbanks-Morse Co., Ltd.; and Toledo Scale Co.

Flat Screens, Hydro-Turbine Co., Ltd.

Stacks, Custodis Canadian Chimney Co., Ltd.

Steel, Dominion Bridge Co.

Thickeners, Sherbrooke Machineries, Ltd.

Tile Tanks and Tile Linings, Canadian Stebbins Engr. & Mfg. Co., Ltd.

Trucks (Electric), Ellwell Parker Electric Co.

Turbine Generators, Westinghouse Electric Corp.

Washers & Thickeners, E. Long Ltd. and Whiting Corp. (Canada) Ltd.

International Paper Co.

Hudson River Mill, Palmer, N. Y.

The Dilts Machine Works, Division of the Black-Clawson Co. has installed in the International Paper Co.'s plant at Palmer, N. Y., a strong fiber refining system. This system provides controlled refining for the strong fiber furnish as well as a means for blending strong and weak fibers for a 100-ton per day production of machine coated book paper. This system will be used in conjunction with newly installed machine coating equipment on the #4 machine.

A 4-way stock system is utilized comprising:

A. Kraft pulp slushed in a 12'-0" Shartle-Dilts Hydrapulper, stored in a stock chest with propeller agitation, and apportioned to the refining system as desired.

B. Unbleached sulphite pulp in slush form pumped directly from the integrated sulphite pulp mill.

C. Bleached sulphite pulp in slush form pumped direct from the bleach chests in the integrated sulphite pulp mill.

D. Groundwood pulp pumped from the groundwood mill.

The kraft and sulphite pulps are apportioned in the desired amounts in either of two cycling chests and passed through two #1 Shartle-Dilts Hydrafiners until the desired strength characteristics have been obtained. The refined pulp is then pumped to a blending chest where groundwood in the desired amount is added. From the blending chest, the refined and blended stock is pumped to the machine chest from whence it is sent to the Jordans and to the machine.

The 3 in 1 chest arrangement consisting of two cycling and one blending chest is equipped with automatic level controls for metering the different grades of stock. The refining system is equipped with completely motorized, electrically operated valves, and the refiners are used continuously since while one chest is being dumped, stock in the other one will be refined.

The Shartle-Dilts #1 Hydrafiners are equipped with automatic Shartle Duotrol units which maintain constant refining power at any predetermined load to obtain optimum results.

The entire system will be operated from a central control panel under the control of one operator. This control panel will be on the beater room floor and will be readily accessible and comparatively easy to manipulate. This system typifies the present day trend toward finger-tip control and dispenses completely with the human element insofar as plug positioning, valve operation, apportioning stock, etc., are concerned.

San Joaquin Division, Fibreboard Products Inc.

E. P. McGINN[1]

Introduction

The new pulp and board mill of the Fibreboard Products Inc. which began operations at East Antioch, Cal., in the Spring of this year is a good example of the present trend in designing pulp mills to use by-products of other wood-using industries.

This mill is designed to use wood waste from planing mills, box and veneer plants for the production of "Tuf-fir" semi-chemical corrugating board; with cull Douglas fir logs being used for the kraft pulp mill. Most of the kraft pulp is bleached and made into various grades of board such as milk bottle stock, butter carton and other food container stock.

Daily production in the new mill is now 125 tons of bleached kraft boards, 25 tons of unbleached kraft pulp and 110 tons of semi-chemical corrugating paper. The unbleached kraft pulp is usually shipped to one of the other Fibreboard mills for the manufacture of liner or other boards.

The management of Fibreboard Products Inc. is well qualified to plan such a mill as this, the corporation having been in existence for over 20 years, operating Sulphite and Groundwood Pulp Mills at Port Angeles, seven Paper Board Mills and eight converting plants. The management of the corporation includes—T. N. Bland, Pres.; N. M. Brisbois, Vice-Pres.; and Robert E. Bundy, Vice-Pres. in charge of Production. The new mill at East Antioch was designed by Leland S. Rosener, Consulting Engineer, E. W. Erikson, Consultant loaned by Crown-Zellerbach Company and C. M. Stitt, Resident Manager of the Antioch Mill during construction, but no whead of Fibreboard's new central engineering division. Present General Manager of the new mill is C. R. P. Cash. Other key personnel at the plant includes A. H. Lindquist, Plant Engr., Warren Current, Ass't. Plant Engr., C. H. Dunn, Board Mill Supt., C. H. Lindley, Pulp Mill Supt., and T. S. Markov, Chief Chemist, R. C. Gilfillan, Pur. Agt., L. P. Ross, Power Plant Supt., S. J. Balog, Supt. of Planning, G. B. McCuish, Personnel Mgr., G. E. Stoodly, Gen. Logging Supt., C. S. Carr, Ass't. Plant Engr. in charge of Power and Maintenance, C. L. Morey, Wood Mill and Yard Supt., L. A. Lance, Chief Electrician, and C. F. Munt, Master Mechanic.

[1] Industrial Editor, Paper Trade Journal.

T. N. BLAND
President

C. R. P. Cash, Resident Mgr. of the new mill has had a wide experience in pulp mill operation having worked at mills in Ocean Falls, B. C.; Tacoma, Wash.; St. Helens, Oregon; The Champion Mills in North Carolina and Houston, Texas, where he was Ass't. Supt. of Kraft and Soda mills for ten years. Immediately before going to Fibreboard he was General Supt. of the Brown Company mills in La Tuque, Quebec and Berlin, N. H.

Wood Supplies

Although most of the wood now being used is purchased from outside sources, Fibreboard owns more than 75,000 acres of forest land in the mountains of Eastern California and Western Nevada. At present most of the big logs are being shipped in from Mendocino and Sonoma Counties in the coastal forest regions North of San Francisco.

In order to make use of some of the waste material that is now being burned in the lumber mills in East Central California, Fibreboard has installed five Carthage chippers in selected lumber mills and two veneer chippers in plywood plants. The chips from these operations are loaded in freight cars and transported to the mill at Antioch where they are unloaded by means of pneumatic conveyors.

Materials Handling

Dry chemicals such as salt cake lime and soda ash are brought up to the plant in freight cars and transferred to storage silos by means of pneumatic conveyors.

Sodium Silicate, alum, caustic soda and rosin size are all received in tank cars from which the material is pumped to storage tanks. Liquid chlorine is also received in tank cars and is used directly from the car.

Wood for the kraft mill is received as large logs usually about 40 feet long and 20-40 inches diameter. These logs arrive in railroad gondolas which are unloaded by a P & H overhead crane. Each carload is equipped with a pair of cable slings, rigged when the car is loaded at the logging operation.

Raw material for the "Tuf-fir" mill arrives in the form of chips in gondolas and slabs, edgings, box plant and planer mill waste in freight cars or trucks. Chips are unloaded by pneumatic conveyors on a gantry loader-unloader. The other materials are dumped or manually transferred to conveyors.

"Tuf-fir" Wood Handling

As previously mentioned, another source of raw material is obtained from box plants and planing mills. This material is in the form of small pieces which are brought to the Antioch mill in trucks or freight cars. It is unsuitable for chipping but is reduced in a heavy duty Williams "Slugger" hammermill.

One of the most unusual features of the mill is the method of storing chips for the "Tuf-fir" system in uncovered pits. The dry climate at Antioch makes it possible to store the chips for long periods without danger of rotting. However, the dry climate also introduces another factor in increased fire hazard. This danger seems to be pretty well taken care of by the fire protection system which was installed by the Viking Automatic Sprinkler Company. This system includes nine detection stations distributed throughout the two chip storage pits. Any dangerous temperature rise inside the chip piles is immediately detected by these stations

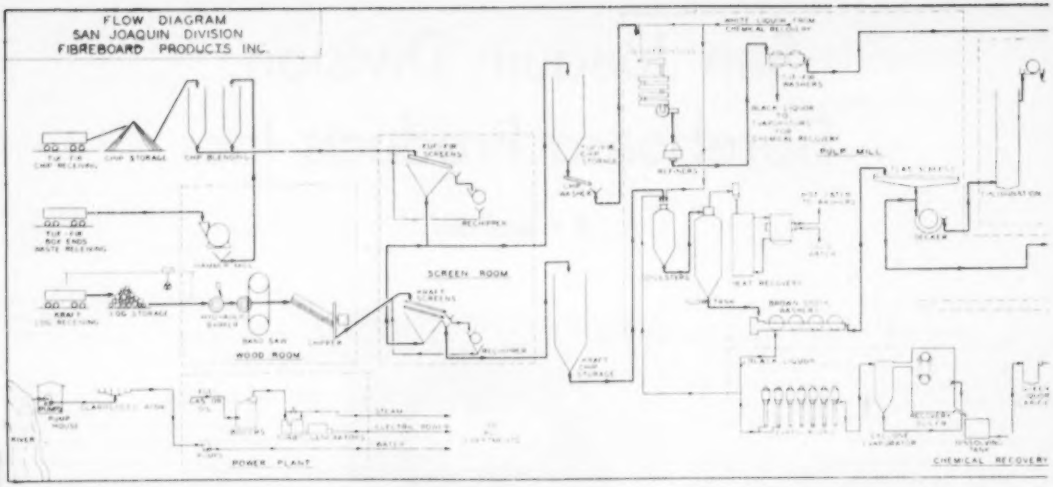
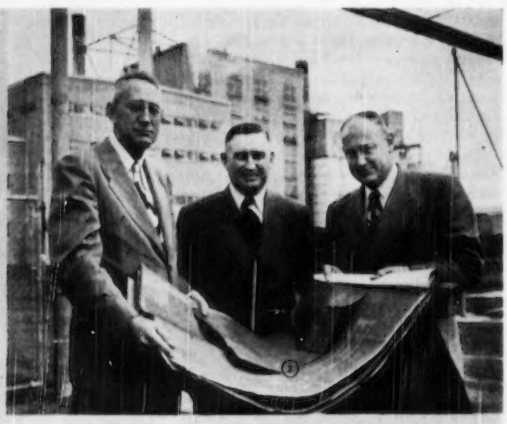
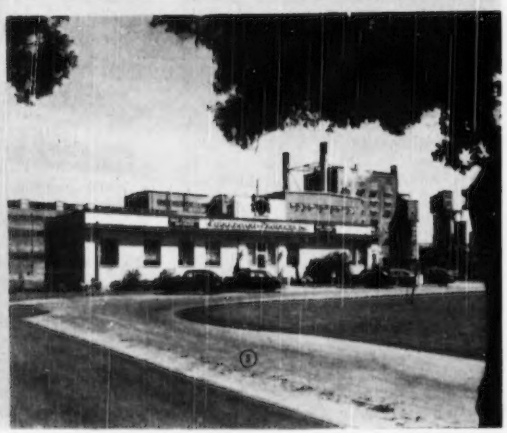
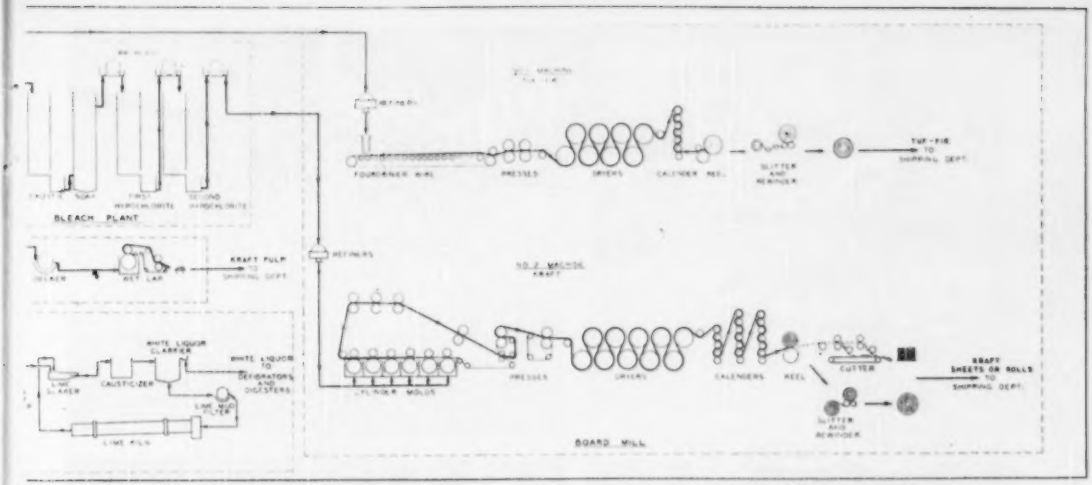


Figure 1—General air view. (A) Suction chip loader-unloader (B) Electric cars which are loaded by (A) with slabwood chips from (C) The electric cars then dump the chips into conveyor (D) and chips are taken to (E) blending tanks, and then up conveyor (H) to pulp plant (M) (K) is the wood room (L) is the Dorr causticizing plant, with Allis-Chalmers lime kiln to be seen plainly (I) is the Rees Blowpipe & Mfg. Co. bark disposal unit (J) is log storage (N) is the machine room (O) is the shipping department, and (P) is the Dorr Clariflocculator. Figure 2—Flow Digaram. Figure 3—C. R. P. Cash (left), appointed manager of San Joaquin Division succeeding C. M. Stitt (center), who becomes manager of company's newly established Central Engineering Division. R. E. Bundy (right) is vice-president in charge of production for Fibreboard. Figure 4—Left to right—C. V. Entrikin, instrument engineer; A. H. Lindquist, plant engineer; L. P. Ross, power plant superintendent; and R. C. Gilfillan, purchasing agent. Figure 5—Exterior view of San Joaquin Division.







by making an electrical contact which sounds an alarm.

Chips from the saw mills are removed from the Gondolas by means of suction conveyors on a gantry type loader-unloader. This chip gantry is mounted on four standard railroad trucks 34 ft. center to center of trucks and 26 ft. center to center of tracks. Height is 90' 6" above top of rails. It contains two identical chip handling units, one for unloading from incoming cars to storage pits, the other for reclaiming from pits to trolley cars which carry the chips to conveyor hoppers. The units each consist of an 18" pipe size Sutorbilt blower driven by a 150 H.P. motor, an 8 ft. dia. cyclone and 30" x 30" Sutorbilt rotary valve.

Incoming chips are discharged from the cyclone onto a 24" Link Belt shuttle conveyor operating on 72 ft. out-riggers on either side of the gantry over the storage pits.

The gantry is powered by four 15 H.P. G.E. d.c. Pacific-Western gearmotors, one chain driven to each of the four trucks for a track speed of 320 fpm. The trolley cars are loaded from storage pits by the suction equipment on the gantry and have a capacity of 650 cu. ft. Each of the two cars is provided with a 30 H.P. G.E. d.c. motor direct connected to a Pacific-Western single reduction reducer and chain driven to the truck axle for a maximum speed of 12 m.p.h.

There are two chip storage pits, each 75 feet wide by 1600 feet long. The nominal capacity of each pit is 7,000 units although each has a maximum capacity of 15,000 units. When chips are being reclaimed from the pits, a Caterpiller Bulldozer is used to keep a supply of chips at the suction nozzle. The chips are carried to the cyclone at the top of the structure from where they flow by gravity to the electric cars which carry them to a hopper from which they flow to a flight conveyor and thence to a rubber belt conveyor.

This 30 in. belt conveyor carries the chips to a steel blending tank about 240 ft. away. There are two of these blending tanks or silos, each having a capacity of 10,000 cu. feet and each equipped with a link-belt rotary chip feeder. One of these tanks is used to store the chips of saw mill waste, slabwood, etc. The other is used for storage of box plant waste which had been reduced in the Williams hammermill.

Material is fed from each of these tanks to a 30" belt conveyor in the desired proportions, usually about 50-50. The two materials are carried to a Sumner chip screen. The shaking action of the screen not only separates the oversize material but also thoroughly blends the accepted chips. Oversize chips are sent through a Williams chip crusher and then returned to the system for rescreening. Accepted material is sent to a storage silo having a capacity of 64,000 cubic feet.

Kraft Mill Wood Supply

Logs for the kraft mill arrive in gondolas and are picked up by a 50 ton overhead log crane which lifts the entire carload by means of a pair of cable slings. These cables are placed in each car before the logs are loaded.

The load of logs may be carried to storage or it may be placed on the elevated wood room log deck.

The P & H log crane has a span of 100 feet, is 660 feet long and has a height of 50 feet from ground to top of rails. Logs have a maximum length of 40 feet and are stored in a double row parallel to the R.R. tracks.

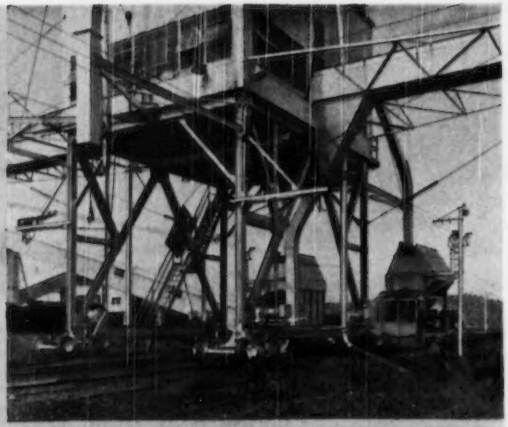
Logs for immediate use, may be taken from cars or reclaimed from storage. They are placed on the log deck and carried by live rolls to the chain conveyor which carries them into the wood room. An 8 foot diameter cut-off saw cuts the logs into lengths of 14 to 20 feet. Logs which are too large in diameter to be cut through by the cut-off saw are finished with a ten foot power-driven drag saw.

After being sawn to the proper length the logs are kicked to a conveyor which moves them laterally to the hydraulic barker. This is a Bellingham type barker built by Sumner Iron Works. The logs are carried under the canvas screening curtain and dropped into the rotating mechanism under the control of the barker operator. This man also controls the conveyors leading to and from the barker. The pressure nozzles, which are set so that the streams of water strike the logs perpendicularly, move along the log from end to end as it is rotated. The speed of movement of the nozzles as well as the speed and direction of rotation of the log are all controlled by the operator who watches the process through panels of safety glass over one inch thick.

Water for the barker nozzles is supplied at 1200 PSI and 600 GPM by two Byron-Jackson multi-tage centrifugal pumps each driven by a 670 H.P. G.E. steam turbine directly connected at 3600 RPM.

Most of the logs from the barker are conveyed directly to the large 175" Sumner chipper. Logs over 42" diameter are sent to the nine foot bandsaw equipped with no-man carriage and shot gun carriage feed. Here the logs may be quartered or slabbed. Quarters under 20" diameter and slabs may be sent to the 84", six-knife Sumner chipper. This machine, which is powered by a 350 H.P. Westinghouse motor, was installed to take care of slabs and cord wood, etc.

The 175" chipper is the first installa-



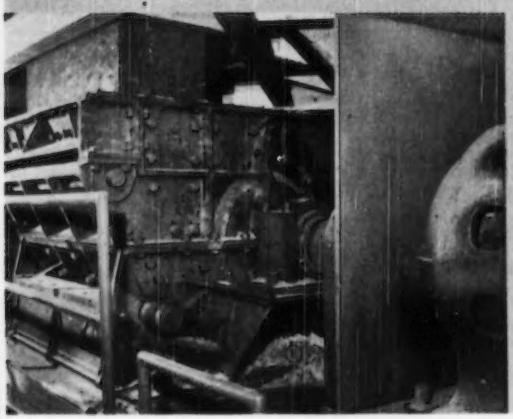


Figure 6—General air view of the wood room and chip handling part of the San Joaquin Division plant, Fibreboard Products Inc. (A) Piles of slabwood chips, ready to be sucked up by (B) gantry type, suction loader-unloader, into (C) small electric cars, which then dump the chips into a track hopper, whence they are conveyed to (D) blending tanks, and are finally conveyed to (E) chip storage silos. (F) is the wood room, and (G) is the Rees bark disposal unit. Figure 7—Close up of the suction loading-unloading gantry, and the little electric cars that feed the slabwood chips to the hopper. Figure 8—Williams hammermill for reducing box plant and planer mill waste for use in semi-chemical corrugating paper. Figure 9—W. S. Tyler Co., Ty-Rock vibrating screens in de-watering chips, after they have been washed for the Tuf Fir side.

tion of this kind to be driven by a steam turbine. A 2500 H.P., G.E. turbine drives the chipper through a Farrel-Birmingham Reduction Gear which brings the speed from 3600 down to 238.8 RPM. Also connected to the gear reducer is an Ingersoll-Rand 19½ x 12 x 10 angle compound air compressor. This unit supplies air to the compressed air system but also acts as a balance to smooth out the speed variations of the chipper disc and power surges caused by the sudden load variations from the finish of one log to the beginning of the next.

The chips are carried by a link belt chain conveyor which dumps them onto a Goodrich belt conveyor five feet wide by 180 feet long which takes them to a surge tank having a capacity of 3200 cu. ft. A link belt rotary plate feeder transfers the chips to another belt conveyor which takes them to the three Sumner chip screens.

Fines from the chip screens are sent to the "Tuf-fir" system. Oversize material is reduced by a Waterville Hammermill rechipper and then returned for rescreening.

Accepted chips are carried by belt conveyor to the storage silos. There are three of these silos, each 38 feet in diameter by 86½ feet high and having a capacity of 64,000 cu. ft. of chips. These silos are made of steel and were built by Consolidated Western Steel Corp. Normally, one is used for storage of "Tuf-fir" blended chips and the other two contain kraft chips.

Semi-Chemical Pulp

The blended chips are reclaimed from the storage silo with another link-belt rotary chip feeder and carried on a belt conveyor to a chip washer consisting of a screw conveyor carrying the material through a water bath, followed by a pair of Tyler "Ty-rock" screens which drain the water. The chips are then transferred to a belt conveyor which takes them to the hoppers located above each of the three chemipulper units. Each of the chemipulpers is equipped with a four tube reaction chamber, the tubes being 24" diameter. Chips enter the unit through a hopper, opening into a screw press feed which acts as a pressure seal. This screw is driven by a 50 H.P. motor.

After passing through the screw feed the chips enter a mixing chamber where white liquor from the kraft mill and steam at 150 PSI are added. The chips then travel in continuous movement down through the tubes of the reaction chamber and thence through the Asplund Defibrator. Each of the reaction tubes is fitted with a screw feed which keeps the material moving at a uniform rate. A 7½ H.P. motor drives the four screws, which are connected by chains and sprockets, at a speed of 7.5 RPM. The Defibrator consists of one rotating and one stationary disc, similar to a disc refiner but more rugged.

Each defibrator is powered by a 250

IMPROVED QUALITY
MORE TONNAGE
AT LESS COST

SUTHERLAND CONTINUOUS BEATERS

IN KRAFT MILLS

PAPER

Sutherlands are in a mill making a wide variety of unbleached papers — weights from 30 to 60 lb., grades from bag & wrapping to asphalt, gumming and multi-wall.

RESULTS:

- High machine speeds
- Low power consumption
- Low maintenance
- Great flexibility of control

BOARD

In a mill making bleached board, Sutherlands replaced jordans and cycling refiners.

RESULTS:

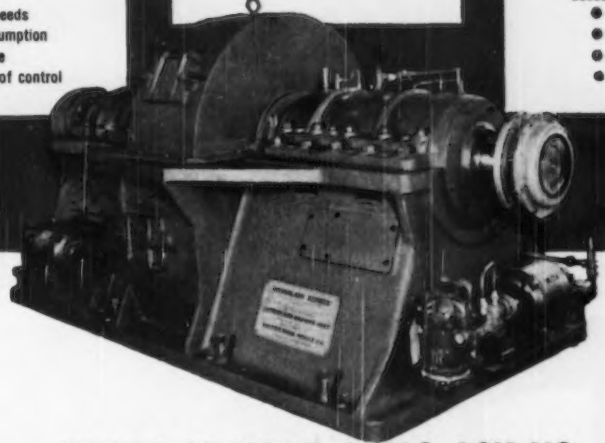
- 33% more production
- 50% less power
- Improved quality
- Lower costs

SPECIALTIES

In a mill making bleached and unbleached specialties, Sutherlands replaced several conical machines to provide a well-beaten, but longer-fibred pulp.

RESULTS:

- 50% less power
- Improved formation
- Improved control
- Improved quality



WHAT OF YOUR MILL? ASK US.

SUTHERLAND REFINER
Corporation

TRENTON, NEW JERSEY

Manufactured in the United States by Valley Iron Works Co., Appleton, Wisconsin

Sutherland Refiner Ltd., Windsor Hotel, Montreal, P.Q.

H.P. synchronous motor operating at 600 RPM. Each chemipulper unit produces about 40 tons of pulp per day, making a total production of 120 tons per day for the three units. Stock from the defibrator passes through a cyclone and then drops into the raw stock chest which has a volume of 8700 cu. ft. with a capacity of 10 tons of stock at 4% cons. From here it is pumped up to two Sutherland 42 inch hot stock Refiners connected in parallel. The Sutherland Refiners are all 42 inch machines provided with stainless steel feed tubes and stainless steel discs. A Westinghouse 350 H.P. Synchronous motor rotating at 450 RPM is directly connected to each refiner. The motors are completely enclosed and cooled by a cooling system.

At this point the stock is still very hot and contains all of the cooking liquor. This stock drops into a chest with a volume of 6950 cu. ft. and a capacity of 8½ tons of pulp at 4% cons. These first two chests are made of steel with vinyl resin coating on the inside, all other stock chests are of concrete.

The refined stock passes directly to the two-stage Impco washing system which is equipped with vacuum cylinders 8 feet diameter by ten feet long. Stainless steel wire is used on these cylinders. From the washers the stock drops to be washed stock chest which has a volume of almost 14,000 cu. ft. and a capacity of 17½ tons at 4% cons.

The semi-chemical pulp from the washed stock chest is passed through three 42" Sutherland Refiners connected in parallel. From the refiners the stock drops into the machine chest which has a volume of 6500 cu. ft. and holds about six tons of stock at 3% cons.

There are two Jordans, connected so that they may be used on either machine as a final touch-up. Handling of the chemi-pulper stock from this point will be continued later with description of the Fourdrinier operation.

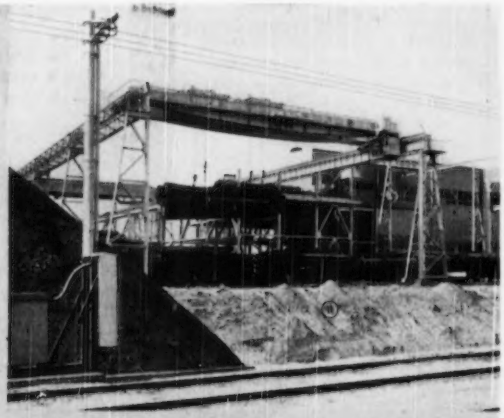
Kraft Pulp Cooking

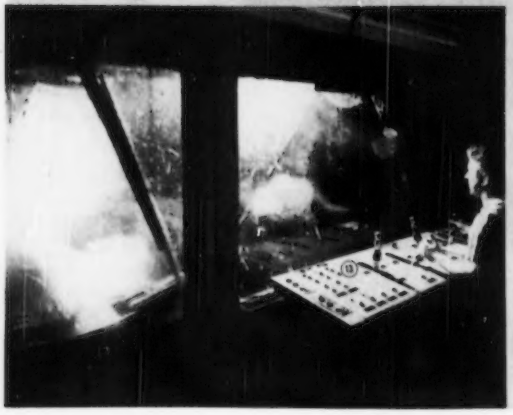
Chips for the kraft system are reclaimed from the storage silos by link belt rotary plate chip feeders which transfer them to 42" wide belt conveyor. A link belt tripper discharges the chips into the proper digester. A special device automatically stops the conveyors and the flow of chips when the desired level has been reached in the digester.

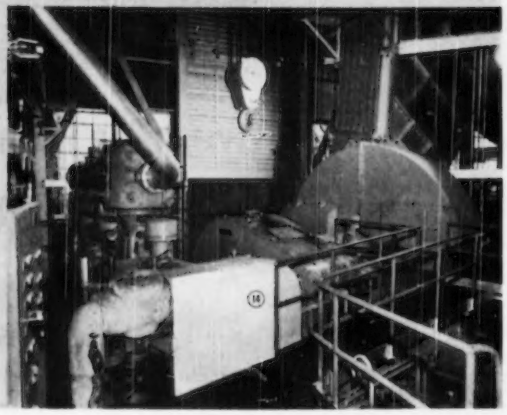
There are three kraft digesters, each having a capacity of 3800 cu. ft. They are stainless lined and were built by A. O. Smith Corp.

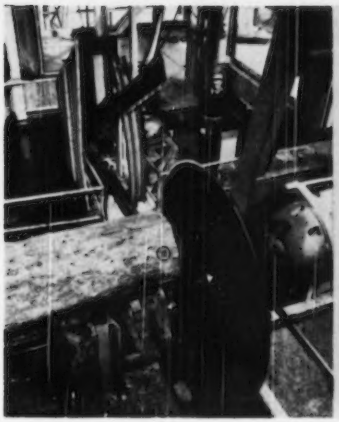
The digesters are equipped with Esco stainless steel heaters and circulating systems. Cooking is indirect, using 150 PSI in the heaters. At the beginning of each cook, 25 PSI steam is used to shorten the warm-up period.

Figure 10—Forty-four ton General Electric diesel electric switch engine, powered with two "Caterpillar" diesel engines brings a load of logs into the San Joaquin Division plant. Figure 11—Taking a carload of logs at a time with a 50-ton P & H traveling crane at the wood mill. Figure 13—Operating platform of Sumner-Bellingham hydraulic barker. Log being debarked may be seen through safety glass at left. Westinghouse control panel at right. Figure 14—View from the log deck, wood mill, showing left the General Electric 2500 hp steam turbine driving a 175" Sumner Iron Works chipper (left), through a Farrell-Birmingham gear unit reduction drive. Behind the GE turbine is an Ingersoll-Rand compressor, used to augment the supply of compressed air in the woodroom. The huge chipper handles 20' logs, 42" dia. in about 18 seconds.









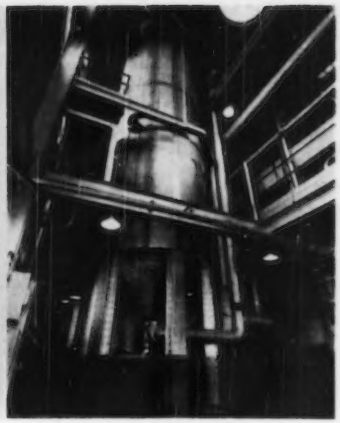
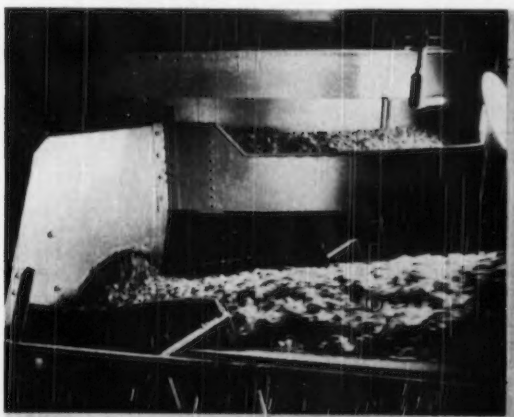
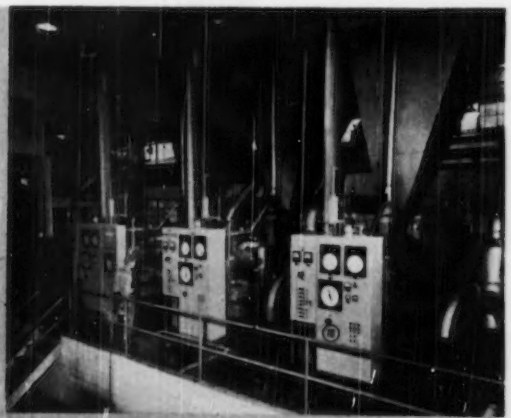
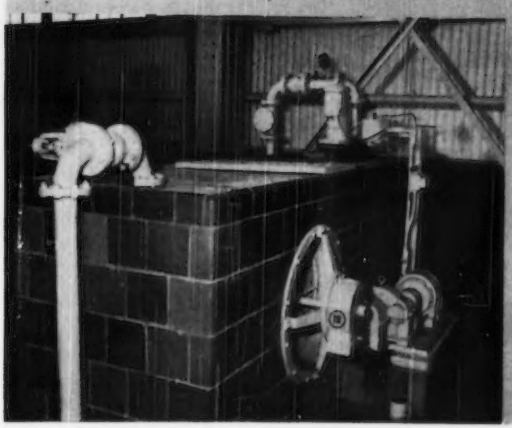


Figure 12—96" Sumner circular saw in foreground, and in the background, the 10' Sumner drag saw, cutting logs to length, before they go to the hydraulic barker. Figure 18—One of the three A. O. Smith 3,800 cu. ft. digesters in the mill. They are stainless steel lines, and are equipped with Yarway remote control valve blow lines, 12" dia. which permit the digesters to be blown in 8 to 9 minutes. These are probably the largest digester blow lines ever installed on kraft digesters. The digesters are equipped for indirect cooking using Essco stainless steel heaters, one of which is seen right (center), and Bingham circulating pumps.

Figure 15—Chips for the bleached kraft side are fed out of a Link-Belt feeder, on to a Goodrich belt conveyor. Figure 16—The three chemipulpers for the Tuf Fir system, with their General Electric controls, and Brown instruments, showing bins above feeders to the B-K reaction chambers. Figure 19—DeZurik consistency regulator and Impco stock meter feeding stock to the bleach plant. Figure 20—View of the Impco bleach and wash plant. In the background left is an Impco second stage hypo washer, and the Impco 4-stage kraft washing system. In the background right is the Impco 2-stage Tuf Fir washer. In foreground are the Impco chlorination stage washer, caustic stage washer, and first hypo stage washer.







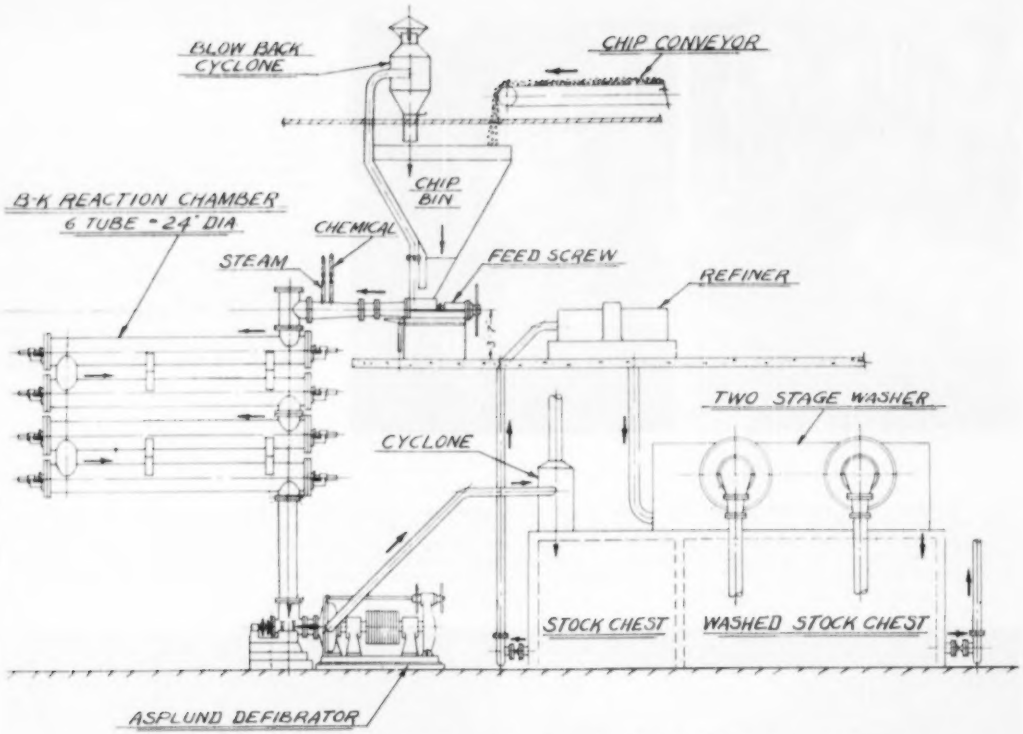


Figure 17—The Chemipulper with Auxiliary Equipment producing Semi-Chemical Pulps for Corrugated Boxes.

Just before blowing, direct steam at 150 PSI is used in the digester.

The twelve inch diameter stainless steel blow lines are unusually large for kraft digesters and allow the cook to be blown in as little as eight minutes.

Yarway, remote control, stainless steel, blow valves are used. The blow tank is 24 feet diameter with 30 feet straight sides and 60° cone bottom. A 42" diameter line carries the steam from the blow tank to the Foster-Wheeler condenser where the heat is recovered in the form of hot water.

Manlift: The digester building is equipped with a "Manlift" supplied by Humphrey Elevator Company. This equipment, which is just beginning to come into general usage in the Pulp and Paper industry, is an invaluable time and labor saver wherever vertical travel of operators is necessary. The machine is essentially an endless vertical conveyor belt with step platforms and hand holds which allow a man to step on and be carried up or down to any floor above or below. The belt travels up and over a top pulley and down the other side to a bottom pulley thus providing transportation in both directions. The belt travels continuously and is thus available at all times. Cables on each side of the belt provide quick stoppage in case of emergency. The machine is equipped with numerous safety devices which automatically stop the belt if a passenger fails to get off at the top or bottom floors, or if any part of his body touches the floor opening edges.

Pulp from the blow tank is pumped to the four stage IMPCO counter current washing system. A pair of IMPCO vibratory knotters remove coarse material before the pulp passes to the first of the four 8 x 12 vacuum cylinders. At present knotter rejects are transferred manually to the "Tuf-fir" system but plans call for a conveyor to move this material continuously to the "Tuf-fir" system.

The washed stock drops into the washed stock chest which has a capacity of 5380 cu. ft. or 6½ tons at 4% consistency. This stock is then pumped to the flat screens consisting of 12 IMPCO screens of 14 plates each arranged in six lines. Line number six is used as a tailing screen and line number 5 may be used as either primary or tailing screen. The primary plates have .010" slots and the tailing plates have .014" slots.

The screened pulp is thickened on an IMPCO 8 x 12 vacuum decker and then passes to the screened stock chest which has a capacity of 10,600 cu. ft.

About 15 percent of the screened stock is sent to a 6 x 10 IMPCO Decker. The thickened stock then passing to a wet machine where it is made into wet laps to be sent to other nearby Fibreboard mills as needed.

Kraft Pulp Bleaching

From the screened stock chest the stock is pumped through an IMPCO stock meter equipped with DeZurik consistency regulator. Chlorine gas is added to the stock as it passes through an IMPCO single shaft mixer. The stock passes upward through the chlorinating tower at a consistency of 3%. This tower is of tile lined concrete, 16 feet diameter by 31 feet high. The chlorinated stock is washed on an 8 x 8 IMPCO acid proof washer equipped with stainless steel wire. The stock at 13% consistency is mixed with caustic soda in two, tandem, double shaft mixers before passing down

through the caustic extraction tower. This tower is 13 feet diameter by 26 feet high.

The stock from the bottom of the caustic tower is diluted to 1–2% consistency and pumped into the bottom of the soak tower where it flows up and into an IMPCO 8 x 8 vacuum washer. The soak tower is 16 feet diameter by 31 feet high.

Washed stock is then mixed with calcium hypochlorite in a double shaft mixer before dropping into the first high density hypochlorite tower which is 13 feet diameter by 26 feet tall. The pulp flows from top to bottom at a consistency of about 12%. From the bottom the stock is pumped up to another 8 x 8 IMPCO vacuum washer. The stock from this washer is then sent through a second high density hypochlorite stage which is identical to the first.

Another IMPCO 8 x 8 vacuum washer completes the bleaching operation. Stock from the washer goes to the bleached stock chest which has a capacity of 10,900 cu. ft. or 13 tons at 4 percent cons.

Bleached Kraft Stock Preparation

Stock is pumped from the above chest through a DeZurik consistency regulator and thence to the four Sutherland Refiners, arranged in parallel and powered by 350 H.P. Westinghouse motors rotating at 450 RPM. The refiner hookup is very flexible so that stock from any refiner can go to any of the three chests: lined, pre-liner or filler chests. If desired all of the refined stock can be combined to make a solid sheet.

The liner chest has a capacity of 3200 cu. ft. or 3½ tons at 3½% cons. The pre-liner chest has a capacity of 3000 cu. ft. or 3¼ tons at 3½% cons. The capacity of the filler chest is 5850 cu. ft. or 6 tons at 3½% cons.

In addition to the refiners there are two Jordans through which the stock may be sent from any of the above chests before going to the board machine. These Jordans are piped so that they may be used on either of the two paper machines.

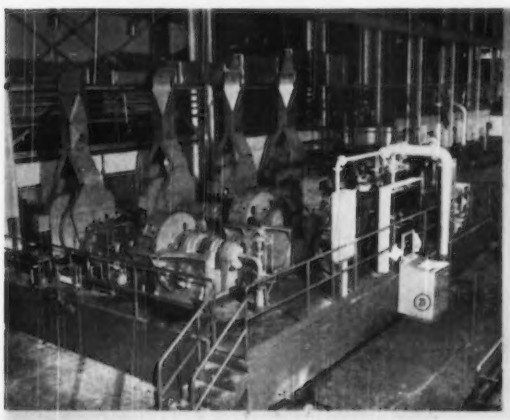
Cylinder Machine—Number Two

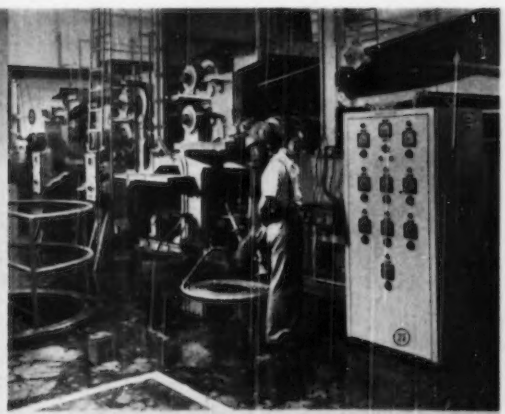
Number two machine, which makes bleach kraft into milk bottle or food container stock, is a six cylinder machine made by Black Clawson Company. The cylinders are 48" diameter by 136" long. The vats are stainless steel of the overflow type with the stock entering at the forward part, traveling down with the bottom felt. The vats are equipped with automatic level controls.

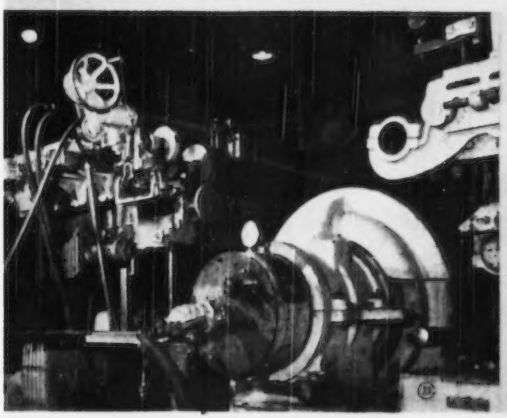
Each vat stock system is equipped with a Shartle Selectifier screen. Six 3000 GPM pumps carry the stock to the selectifier screens at about 1% consistency. The stock is then diluted to about .2% and pumped to the vat headboxes by the six 7000 GPM circulation pumps.

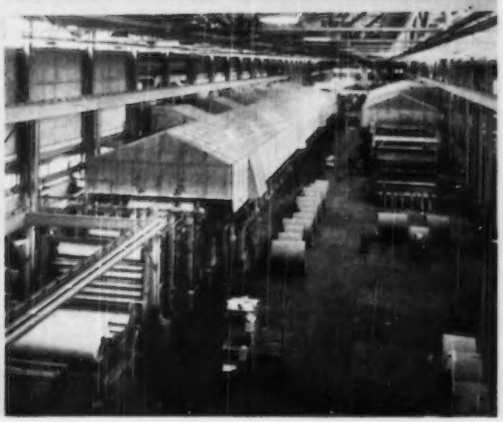
The machine is equipped with two primary presses and a suction drum roll. The main presses consist of a plain press and one suction press followed by another plain press.

Figure 21—View of the Sutherland refiners on the Black-Clawson machine side. Figure 22—C. H. Dunn, board mill superintendent, watches the General Electric control panel on the Black-Clawson machine. Figure 23—Beloit Iron Work suction couch roll on the Pusey & Jones Machine, Fibreboard Products. Also in this picture to the middle left is shown the Gilbert & Nash wire guide. Figure 24—General view of the machine room. Left is the Black-Clawson bleached kraft machine, and right rear is the Pusey & Jones Tuf Fir nine point machine. J. O. Ross Engineering Co. hoods are over both machines.









There are 62 dryers plus five felt dryers on this machine, all 60" diameter and all equipped with sleeve bearings.

The cylinder machine is driven by a General Electric multiple generator amplidyne controlled sectional drive. This machine is divided into ten sections. In addition there are ten small helper motors, one for each of the cylinders, primary presses and suction drum roll. These helper motors reduce the load on the first main press which, without them, would have to pull all of the cylinders, primary presses, etc., through the felt. Thus, the tension on the bottom felt is greatly reduced and its life lengthened by the use of these motors.

The machine is equipped with three calender stacks composed of Farrel-Birmingham rolls in Black-Clawson frames. All calender rolls have Bird-Vickery Doctors. The Black-Clawson Pope type reel is followed by a Black-Clawson duplex sheet cutter equipped with Cameron slitters. A Langston Rewinder is located at the delivery end of the sheet cutter for use on shipping rolls when the cutter is not needed. An overhead crane roll-hoist transfers rolls from the reel to the unwinding stands of either the sheet cutter or rewinder, as desired.

Fourdrinier Machine—Number One

Number one machine is a fourdrinier designed for the production of nine point corrugating. The machine was built for speeds up to 1200 feet per minute. At present it is equipped with 40 five foot dryers which provides drying capacity for a maximum speed of 600 feet per minute on nine point. However, space is available for the future installation of additional dryers to double the production.

A 12,000 GPM fan pump supplies stock to the flow spreader leading to an open head box, eight feet high. Both flow spreader and head box are lined with neoprene.

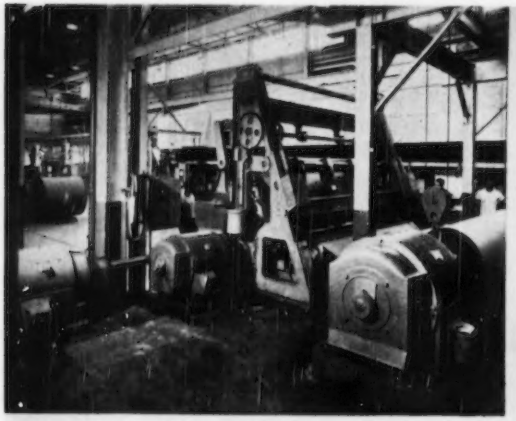
The fourdrinier is equipped with a wire 156" wide and 100' long. It has seven flat suction boxes, each seven inches wide, a 36" diameter suction couch and a lump breaker roll. The press section consists of two simplex close-coupled main presses each having 28" diameter rubber covered suction rolls and pneumatically loaded top rolls. The press felts are continuously cleaned by Vickery felt conditioners. There are two dryers sections each having 20 paper dryers with six felt dryers in the first and two felt dryers in the second section.

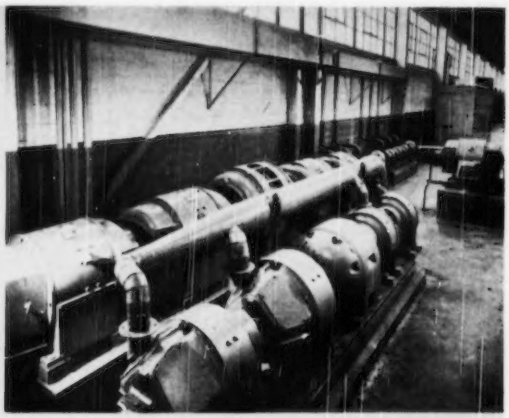
Each dryer section is equipped with one upper and one lower dryer felt. All of the dryers are 60" diameter and are equipped with rope carriers.

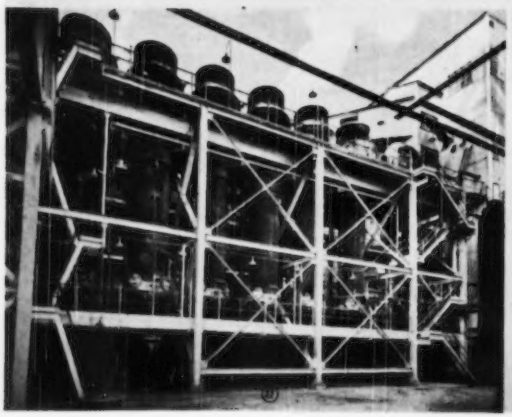
The single calender stack has seven rolls all except the bottom being equipped with roller bearings. The stack has pneumatic nip loading with Mason-Neilson controls. The rolls are equipped with Bird-Vickery Doctors.

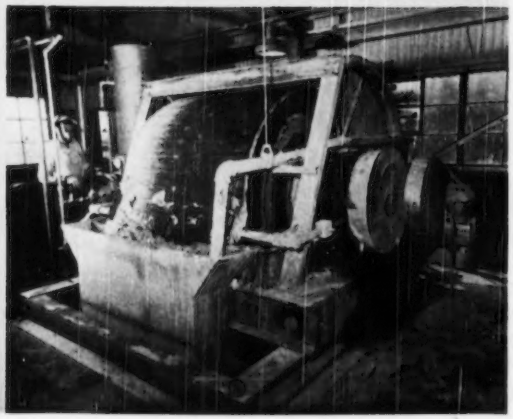
The Pope type uniform speed roll is the latest Pusey-Jones design with an adjustable pneumatic loading mechanism that simplifies reel changes and

Figure 25—General Electric drive on the Pusey & Jones rewinder. Yale & Towne lift trucks handling finished rolls in the background. Figure 26—General Electric motor generator, sectional drive on the Black-Clawson machine. Figure 27—The Goslin-Birmingham sextuple effect long tube, fin type black liquor evaporators. Figure 29—Swenson line mud filter in the Dorr causticizing plant.









improves the safety features. The Pusey-Jones winder is equipped with a hydraulic roll unloading mechanism that automatically places the finished rolls on the floor. An air-hoist cable winch pulls the shafts from the rewound rolls. An overhead crane roll hoist carries the rolls from reel to winder stand.

All gears in the back of the dryer sections are enclosed within the dryer frames. Except for the bottom roll of the calender stock, all roll bearings on this machine are SKF roller bearings. Lubrication is provided by Bowser pressure lubrication systems which continually circulate oil through a filtration and cooling system and then back to the bearings.

Paper Mill Auxiliaries

The machine is driven by a General Electric multiple generator amplidyne controlled sectional drive. There are seven sections of this machine each having its own generator. The seven generators are on a single shaft driven by one AC motor. Individual exciter generators are also driven by one AC motor on a common shaft.

Both the Pusey-Jones winder on number one machine and the Langston Winder on number two machine are equipped with General Electric constant tension regenerative braking variable speed drives. Each drive includes an amplidyne controlled D.C. motor which drives the winder shaft and a braking generator on the unwind stand. This generator acts as brake by applying the amount of rotational resistance necessary to maintain the tension on the web at the exact setting. This tension is adjustable over a wide range and is held constant during acceleration, deceleration or steady running.

Instead of dissipating the energy into heat as a friction brake would do, this equipment transforms it into D.C. current which is fed into the D.C. line that supplies the driving motor. Thus it is possible to operate these winders with a minimum amount of power.

Ventilating, Heating and Cooling

On the number one Pusey-Jones Fourdrinier machine J. O. Ross Engineering Co. furnished the complete hood and exhaust system and a standard Ross-Grewin System. The machine calender is equipped with a standard Ross Calender Cooling system using air filters.

The number two Black-Clawson machine also has a standard Ross Hood and Exhaust System and a Ross Grewin System.

The Hood exhaust fans on both machines are located on mezzanine floors in back of each machine with the exhaust stacks going vertically up through the roof of the mezzanine. For both machines Ross furnished all motor cooling ducts for furnishing air to the externally ventilated variable speed drive motors. All air supplied to the motor is filtered through Multi-Duty Continuous Automatic Air Filters.

A reasonable air balance for the mill, to replace the air exhausted from the paper machine hoods, is obtained by supplying filtered air for heating and ventilating. Two large heating and ventilating supply units deliver air to the roof of the paper machine room and to the mezzanine spaces in back of the machine. Four large make-up air units are located in the basement, taking outside air and warming it for delivery to the basement, thence to rise up around the machine dryers. A separate heating and ventilating system delivers outside air, heated and filtered, to the stock preparation building, this air also moving into the machine room.

All heating and ventilating systems have thermostatic control, the roof systems being supplied with the new, differential type of thermostatic control whereby the supply air temperature is controlled by the outside air temperature. Air filters are of the Multi-Duty, continuous Automatic Oil Type filters.

The Bleach Plant and Brown Stock Washing Plant have nine distinct ventilation systems as follows:

A. Exhaust from Chlorination Washer. This is an Impco enclosed washer and the exhaust is taken from beneath the floor.

B. Exhaust System from two Hypochlorite Bleach Towers. This is required to provide a strong negative pressure inside the towers. All duct work is of Transite pipe and fittings.

C. Exhaust System from Chlorination tower. This is similar to Item B. but has a separate fan.

D. Hood and Exhaust System over Deknotter and five Brown Stock Washers. This hood is continuous, about 72′ long and 17½′ wide. The exhaust is taken off beneath the crane which passes over this entire area.

E. Hood and Exhaust System over Semi-chemical Stock Washers 1A and 2A. This hood is about 36′ long and 16′ wide.

F. Exhaust Fans for Screen and Decker area. Three exhaust units are located in the West wall with the purpose of drawing the warm, humid air away from the screens and thus to prevent it diffusing through the building. Each of the three fans handles about 6,200 cfm.

G. Heating and Ventilating System for operating floor. About 32,000 cfm are supplied for ventilating the Bleach Plant and Brown Stock Washer Room, most of this air being exhausted through the washer hoods. All air is filtered through Multi-Duty self-cleaning filters and is under temperature control.

H. Ventilating System for Switch Room and Motors.

I. Motor Cooling System for supplying filtered cooling air to the various D.C. motors and washer consoles.

Roll Storage and Shipping

Rolls of corrugating paper from number one machine or kraft board from number two are picked up from the ends of the machines by lift trucks, weighed on the five tone Fairbanks Morse scale near the end of the machine room and then carried to the loading platforms where they may be loaded into trucks or railroad cars. The rolls may also be carried to the roll storage pit located at the side of number one machine, where they are handled by a P & H overhead crane equipped with roll grab.

Sheet stock from number two machine is made into bundles or pallets and bound with steel straps. These bundles are also carried by lift trucks to the loading platforms or to the storage and finishing room located beyond the end of the machine room.

Recovery Plant

The recovery plant serves for both the kraft mill and the semi-chemical mill. This is somewhat different than the usual systems, and only occurs when both a kraft or soda pulp mill and a semi-chemical mill are operated together. Ordinarily, it is uneconomical to install a recovery to burn waste liquor from chemi-pulper systems because the amount of cooking liquor used is much less than for a kraft mill and because the amount of organic solids available for burning in the black liquor is very small. However, the recovery plant in this mill has a capacity to handle liquor requirements for the manufacture of 225 tons per day of kraft pulp and the present production of kraft pulp is about 150 tons per day. Consequently, the system can easily handle the waste liquor from the chemi-pulpers and furnish white liquor for cooking, thus increasing the efficiency of the operation and at the same time eliminating a source of stream pollution from the chemi-pulpers.

Strong black liquor from the washer seal tanks of both systems goes to the Impco foam breaker and thence to the black liquor storage tank from which it is pumped to the evaporator.

The evaporator is a Goslin-Birmingham six-body, sextuple effect installation with stainless steel tubes and stainless steel clad tube sheets in the first effect. Tubes in all effects are 26 feet long. This evaporator has sufficient capacity to receive 194,000 lbs./hr of liquor at 15% total solids and deliver 53,000 lbs./hr of heavy liquor at 55% total solids, equivalent to an evaporation rate of 141,000 lbs. of water per hour. Vacuum is applied to the sixth effect by means of an S & K Barometric condenser.

The heavy black liquor is pumped to the Babcock-Wilcox recovery furnace where it passes through the cyclone evaporator which further concentrates it to about 60% solids. Part of this heavy liquor is bled off to dissolve chemicals recovered in the Cot-

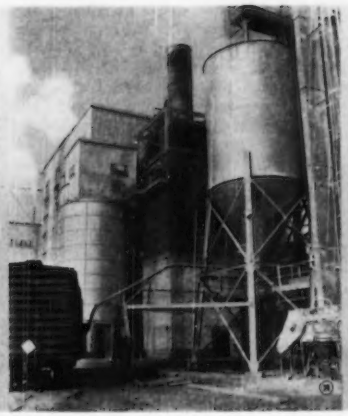


Figure 28—General view of the Dorr causticizing plant. On the left may be seen the Allis-Chalmers lime kiln. Figure 30—Lime being unloaded by Fuller Airveyor. In the background may be seen the Cottrell precipitator installed by Research Corp., and the salt cake storage tank. Figure 33—A view of the Dorr Clariflocculator.

trell precipitator which then goes to a mixing tank where the rest of the heavy liquor and make up salt cake are mixed before being sprayed into the furnace.

Salt cake from the storage silo is carried on a belt conveyor, over a Merrick Weightometer before dropping into the mixing tank. Thus the rate of flow may be accurately controlled and recorded.

The B & W recovery furnace is a modified Tomlinson spray type unit having a capacity of 100,000 lbs. of steam per hour at 600 PSIG and 750 degrees F. Both induced and forced draft Clarage fans are driven by G. E. steam turbines. Stack gases go through a Cottrell precipitator built by Research Corporation, where the suspended solids are collected, to be returned to the system.

Smelt from the recovery furnace drops into the enclosed 17 foot diameter dissolving tank. Three Worthington pumps are used to circulate the green liquor in the dissolving tank and to pump green liquor to the causticizing system.

The Dorr continuous causticizing system includes one green liquor clarifier, one lime slaker, three causticizing tanks, one white liquor clarifier, one dregs washer and one lime mud washer.

The green liquor from the dissolving tank is clarified in a four compartment green liquor clarifier. The clarified green liquor from this unit flows directly to the lime slaker, where the causticizing reaction is started. The settled dregs from the green liquor clarifier are sent to a four compartment washing thickener where the dregs are given four stages of counter-current decantation washing. The dregs move down through the unit, by passing through hydraulic seals in each tray. The wash water is added to the bottom compartment and the liquor overflowing the top compartment goes to weak liquor storage.

Lime from the reburned lime bin and new make-up lime is fed continuously by means of a screw conveyor to the slaker. In the slaker, the lime is contacted with clarified green liquor from the green liquor clarifier. The combination lime slacker consists of a slaking tank with agitator into which is built a standard Dorr Classifier section. There is an opening connecting the slaking and classification sections so these two operations are combined in a single unit.

From the Slaker-Classifier, the partially causticized slurry passes through three Causticizer tanks in series. These tanks, which provide sufficient detention time for the causticizing reaction to be completed, are equipped with stainless steel agitators.

From the Causticizers, the causticized slurry enters the white liquor clarifier where the calcium carbonate is settled and the clarified white liquor is overflowed and sent to white liquor storage. The white liquor clarifier is a three-tray, four compartment balanced tray thickener, in which all the compartments are operated in parallel.

The settled lime mud from the white liquor clarifier, containing about 40 percent solids, is pumped to the lime mud thickener-Washer, where it is given two stages of washing prior to filtration.

Clarified white liquor goes to the white liquor storage tanks. The lime mud goes to a Swenson vacuum filter, the filter cake from which, is carried by screw conveyor to the Allis-Chalmers lime kiln. This kiln is 250 feet long with diameters of seven and eight feet.

It will be noted that the kiln is a two diameter unit with the enlarged section of 8′ diameter extending for 60 feet at the discharge end and tapering to 7′ diameter for the remainder. This kiln incorporates the advantage of a relatively small diameter and long length, that is, a high slenderness ratio necessary for good fuel economy. The enlarged firing zone provides a greater internal volume for the combustion of the fuel and also a greater heat transfer surface in the portion of the kiln that requires it the most. It also allows the lining of the enlarged portion of the kiln to have a heavier lining without the disadvantage of restricting the opening of the kiln as would be true in a single diameter kiln.

The nominal rated capacity for this kiln is 75 tons of reburned lime per day.

The feed end portion of this kiln is equipped with an internal chain system and spirals which include approximately 2,300 lineal feet of chain transfer of heat. The chain system starts three feet from the feed end of the kiln and extends approximately 25 feet. Due to the efficient heat recuperation of the chain system, the exit gases leaving the kiln are approximately 350 degrees F when handling a sludge feed containing approximately 45 percent moisture.

The filter cake from the rotary filter preceding the kiln drops into a water jacketed screw conveyor which projects inside of the feed end opening of the kiln and discharges the lime sludge feed at this point from where it is conveyed due to the rotation of the kiln by internal spirals into the chain system.

The kiln is driven by an Allis-Chalmers 40 H.P., 1200/900/800/450-rpm, four speed squirrel cage motor connected by a texrope drive to the high speed shaft of a herringbone gear reducer.

The kiln drive is equipped with an auxiliary gasoline engine drive ar-

rangement which is connected to the gear reducer unit through a roller chain drive and packshaft arrangement with a spiral coupling for disengagement and engagement so that during any power failure, the gasoline engine would be manually started and the spiral jaw clutch engaged to rotate the kiln at approximately 1/10 normal operating speed. Rotation of the kiln during power failure is necessary to prevent warping or other distortion which would ensue if the kiln were allowed to remain stationary on its supporting mechanism with a stationary hot charge of material. Such a situation would create unequal expansion effects.

The kiln is fired with a Coen Engineering Company combination natural gas or Bunker C type fuel oil burner. The changeover from one fuel to the other can be readily accomplished by either inserting or removing the oil burner assembly which is inserted inside the burner length. This changeover from one fuel to the other can be accomplished in a matter of a few minutes.

Allis-Chalmers also furnished a master kiln control panel mounting the various operating instruments which indicate the temperature of the exhaust gases leaving the kiln, the temperature in the burning zone of the kiln, the fuel oil rate, the fuel gas rate, and also an automatic draft controlling system which can be operated either manually or automatically. The control panel also mounts the push button stations for the various motors driving the kiln, screw feeder, exhaust fan, etc. The panel is totally enclosed with all internal circuits completely wired prior to installation.

Power Plant

The main power plant consists of two Babcock & Wilcox, double drum boilers each having a capacity of 160,000 lbs. of steam per hour at 600 PSIG and 750 degrees F. These boilers are normally fired with natural gas but are also equipped to burn bunker C oil which is used as a reserve fuel.

Steam from these boilers is combined with that from the recovery boiler to make a total supply of 420,000 lbs./hr at 600 PSIG and 750 degrees F.

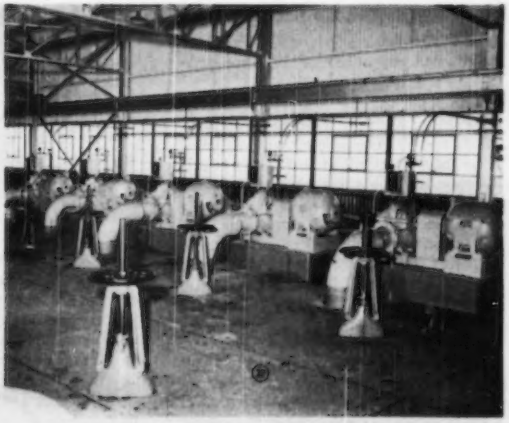
Electric power is generated by three turbo generators each producing 5000 KVA at 4160 volts, 3 phase, 60 cycles and rotating at 3600 RPM. The turbines operate on steam at 600 PSIG and 750 degrees F. Two of the turbines are equipped with condensers and the other exhausts at 25 PSIG. Extraction is at 170 PSIG and 50 PSIG. The power generated at 4160 volts is distributed from the central station in the generator room to eight load centers where it is transformed to 440 volts.

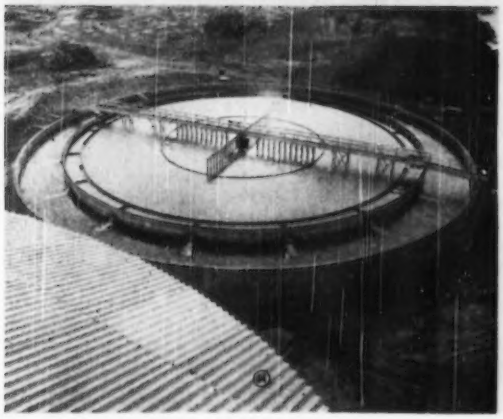
Water System

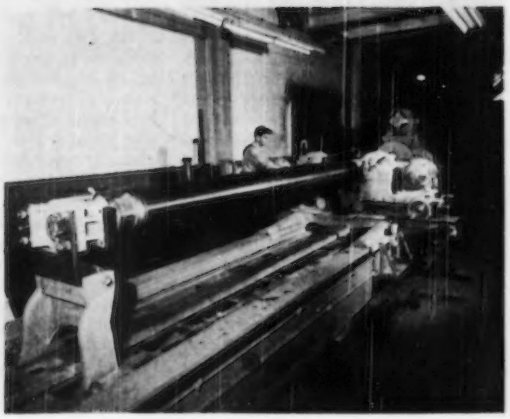
More than 14 million gallons of water are pumped from the San Joaquin River for use in the mill. Part of this water is used untreated for the fire protection system and for the barometric condenser on black liquor evaporators.

The main pump house which is located on the South bank of the San Joaquin River contains. DeLaval influent pumps taking river water from

Figure 31—View of the three GE 5000 KVA turbine generators that supply electrical energy for the entire mill. Figure 32—View in the river pump house showing the DeLaval pumps. Figure 34—Chicago Bridge & Iron Works fire protection water tank. Figure 35—Lobdell roll grinder.







a raw water sump equipped with a link belt travelling screen, and sending it to the clariflocculator.

Three of these pumps have capacities of 500 GPM at 68 feet head and 18 feet suction. They are driven at 1150 RPM by 100 H.P. G.E. motors. The other two DeLaval pumps are rated at 2500 GPM, 68 feet head and 18 feet suction. They are driven at 1150 RPM by 60 H.P. G.E. motors. These raw water mill supply pumps automatically go into operation as needed.

Two 2200 GPM DeLaval pumps, driven at 1750 RPM by 100 H.P. G.E. motors, pump raw water at 126 feet head and 15 feet suction to the S & K barometric condenser on the black liquor evaporator. This water is then discarded.

The fire protection system has five pumps including three Fairbanks Morse pumps equipped with Fairbanks Morse motors. Two of these are rated at 1500 GPM and one is rated at 1000 GPM. A 1500 GPM DeLaval pump driven at 1750 RPM by a 125 H.P. Cent. motor, pumps at 231 feet head and 15 feet suction. For emergency use in case of power failure, a DeLaval 2000 GPM pump is equipped with a Waukesha gas engine. A 100,000 gal. elevated storage tank supplied by Chicago Bridge & Iron Co. provides water and pressure for the fire protection system.

The mill supply water is treated with an activated silica solution called "Baylis-sol" before being pumped into the center portion of the Dorr clariflocculator. This circular unit is divided into three concentric compartments as follows: the center portion, or mixing chamber, has an outside diameter of 70 feet. Water flows from this part underneath a baffle into the settling chamber which occupies the space from 70 feet to 150 feet diameter. Clear water from this compartment overflows into the clear well which is the outer part of the circle between 150 feet and 186 feet diameter. The clear well is nine feet deep and the other compartments are ten feet deep. The unit has a capacity of about 600,000 gallons per hour with an overall volume of about 2,000,000 gallons, one third of which is in the clear well. A combination overhead walkway and double arm agitator extends completely across the unit and rotates at a speed of 1⅓ revolutions per hour. In the center well another right angle cross arm makes this portion a four arm agitator.

In addition to the main pumphouse on the river bank, there is a pump room on the ground floor of the main building near the power house. This pump room contains four DeLaval mill supply pumps, three DeLaval turbine condenser circulation pumps and three Ingersoll-Rand 18 x 11 x 12 dual compressors each producing 895 CFM at 125 PSIG.

Water is taken from the clear well by three 5000 GPM DeLaval pumps, circulated through the turbine condensers, back through the mill pump room and to the clear well. At the mill pump room, four 3000 GPM pumps driven by 100 H.P. G.E. motors take the water from the condenser circulation line and pump it to various parts of the mill.

Water that is returned to the clear well goes in on one side of the partition separating the outgoing from the incoming lines of the circulation system. Thus, water returned to the clear well must travel almost the complete 360 degrees around the circumference before it can be drawn into the circulation line again. This avoids pulling warm water into this line. Another precaution which is taken to prevent excessive temperature rise in the clear well is the inclusion of a pump valve in the return condenser circulation line just before it enters the clear well. When the temperature of the water at that part of the clear well reaches 90 degrees F., the return circulation water is automatically discharged to the sewer.

Chemical Treatment of Water

As previously mentioned, the water is treated with "Baylis-sol" before going to the clariflocculator. This chemical consists primarily of activated silica and alum. The activated silica is made by diluting Sodium Silicate to about 1½ percent SiO_2 and adding sufficient Sulfuric acid to neutralize about 80 percent of the Alkali. This solution is allowed to age several hours before being used. Two cylindrical mixing tanks with vertical agitators are used to prepare this solution. The solution is used from one tank while the other is aging. Alum and silicate are stored in horizontal cylindrical tanks and the sulfuric acid is stored in a rectangular tank.

The activated silica and alum solutions are injected into raw water line, before it enters the clariflocculator, by means of two chemical pumps driven by General Electric Thy-mo-trol variable speed drives. The speed of the drives is regulated by the rate of flow of the raw water to the clariflocculator as measured by a flowmeter.

The chemicals are added to the ratio of three parts of alum to one part of silica. The dosage is adjusted as the turbidity of the water changes. The floc produced by these chemicals begins to form as the water enters the mixing chamber of the clariflocculator. As the water slowly moves outward under the baffle into the settling chamber the floc settles out leaving the clear water on top. Near the outer circumference of the settling chamber the clean water is laundered off into the clear well.

Mill Effluent

The total mill effluent consisting essentially of waste water from bleaching system, paper machines, chip washing, hydraulic barker filtrate and general sewers is put through a screen to remove solids and then treated with lime to bring it to approximately neutral pH. It is then pumped by five Fairbanks Morse 8 inch, 3350 GPM pumps, through a 1900 foot pipe line across the bottom of one channel of the river, over an island and into the main channel. Addition of the lime is regulated by a Beckman automatic pH controller.

Buildings

The main building, which is composed of several integrated sections, is made of structural steel and reinforced concrete and is 1000 feet long and 200 feet wide overall, the paper machine room is 88 feet wide by 414 feet long. The different departments within this building include: roll storage; finishing and shipping; paper machine room; washer and screen building including chemi-pulpers and bleach plant; digester building, recovery plant and power plant. The paper machine room, the pulp washer and bleaching plant and the roll storage pit are all equipped with heavy duty P & H overhead travelling cranes.

The wood room is in a separate structural steel and reinforced concrete building, 100 feet wide by 161 feet long and is equipped with a P & H overhead travelling crane equipped with clam shell for handling Cordwood slabs, etc. The chipper room is equipped with a large overhead travelling crane. The main pump house is a single story building, 46 feet wide by 160 feet long built of structural steel with corrugated asbestos siding and roof.

Maintenance Equipment

The mill has a machine shop equipped with a vertical boring mill, two shapers, a milling machine, several drill presses and lathes.

Maintenance equipment also includes a Lobdell roll grinder large enough to handle any of the rolls now being used in the mill.

Wood mill maintenance equipment includes a Hanchett knife grinder for chipper knives, a Hanchett circular saw grinder, Armstrong band saw stretcher, air swedge and band saw grinder.

Suppliers of Equipment

Allis-Chalmers Mfg. Co.: *Lime Kiln; Pulp Stock Pumps.*

American Defibrator, Inc.: *Asplund Semi-Chemical Process.*

Babcock & Wilcox Co. (Actual installation by C. C. Moore & Co.): *2 — Power Boilers; 1 — Recovery Boiler.*

Bailey Meter Co.: *Power House Instrumentation.*

Beloit Iron Works: *Paper Machine Presses and Suction Rolls.*

Bingham Pump Co.: *Digester Circulating Pumps.*

The Black-Clawson Co.: *136" Cylinder Paper Machine.*

Brown Instrument Co. — (Division Minneapolis-Honeywell Reg. Co.): *Pulp Mill Instrumentation.*

Buffalo Forge Co.: *Forced and Induced Draft Fans on Power Boilers.*

Byron Jackson Co.: *Hydraulic Barker Pumps.*

Cameron Machine Co.: *Slitter on # 2 Machine.*

Chapman Valve Co.: *Valves — Piping.*

Chemical Proof Construction Co.: *Durafilm Lined Pipe.*

Chicago Bridge & Iron: *Gravity Tank for Fire Protection.*

Coen Burner Co.: *Power Boiler Burners; Lime Kiln Burners.*

Consolidated-Western Steel Corp.: *Chip Bins and Tanks.*

Crane Co.: *Valves and Pipe Fittings.*

DeLaval Steam Turbine Co.: *Mill Water Supply Pumps.*

DeZurik Shower Co.: *Consistency Regulators.*

The Dorr Co.: *Causticizing Plant Equipment; Mill Supply Water Treatment Equipment.*

Duriron Co., Inc.: *Acid and Caustic Pumps.*

Electric Steel Foundry: *Digester Heaters.*

Elliot Co.: *Power Plant Deaerating Heaters.*

Fairbanks-Morse & Co.: *Effluent Water Pumps.*

Farrel-Birmingham Co., Inc.: *Speed Reducer on 175" Chipper Drive.*

Foster Wheeler Corp.: *Digester Heat Recovery System.*

Fuller Co.: *Airveyors for Unloading Salt Cake and Lime.*

General Electric Co.: *3 Turbo-Generators; Electrical Drives for both Paper Machines; Electric Motors; Switch Gear and Substations; Diesel Electric Locomotive; Turbines for Recovery Boiler Fans, Boiler Feed; Pump, Hydraulic Barker Pumps and 175" Chipper.*

Goodrich Rubber Co.: *Rubber Conveyor Belts on Chip Conveyors.*

Goslin-Birmingham Mfg. Co., Inc.: *6-Body Sextuple Effect Black Liquor Evaporator.*

Griscom-Russell Co.: *Power Plant Feed Water Evaporators.*

Hanchet Mfg. Co.: *Knife Grinding Machines.*

Harnischfeger Corp.: *Electric Traveling Cranes.*

Humphrey Elevator Co.: *Manlift.*

Improved Paper Machinery Co: *4-stage Kraft Brown Stock Washers; 2-stage Semi-Chemical Washers; 12 Flat Screens; 2 Deckers; Wet Machine; Chest Agitators; Bleach Plant Equipment.*

Ingersoll-Rand: *900 cfm Air Compressor—3; Boiler Feed Pumps; Turbine Condensers.*

LaBour Co.: *Black Liquor Evaporator Pumps.*

Samuel M. Langston Co.: *Winder on #2 Machine.*

Link-Belt Co.: *Chip Conveyors, Chip Feeders.*

Lunkenheimer Co.: *Valves, Piping.*

Midwest-Fulton Co.: *Vapor Circulation System on both Paper Machines.*

Milton Roy Co.: *Chemical Proportioning Pumps.*

Nash Engineering: *Vacuum Pumps on Paper Machines.*

Otis Elevator Co.: *Elevators.*

Pacific Western Gear: *Gear Reducers and Gear Motors.*

Paper & Industrial Appliances: *3 Four-Tube B-K Reaction Chambers for Chemi-pulpers.*

The Permutit Co.: *Boiler Feed Water Treatment Equipment.*

Pioneer Rubber: *Rubber Hose.*

Pusey & Jones Corp.: *156" Fourdrinier Paper Machine.*

Reitz Blow Pipe Co.: *Bark Disposal Unit.*

Republic Supply Co.: *Valves, Piping.*

Research Corp.: *Electrical Precipitator on Recovery Boiler.*

J. O. Ross Engineering Corp.: *Ventilation Equipment.*

Shartle Bros.: *Pumps for Paper Machines.*

A. O. Smith Co.: *3-3800 cu. ft. Stainless Steel Clad Digesters.*

Stebbins Engineering Co.: *Tile Work in Bleach Plant.*

Sumner Iron Works: *175" Chipper; 84" Chipper; Sawmill; Hydraulic Barker; Wood Room Log Handling Equipment; Chip Screens.*

Sutorbilt Corp.: *Gantry Type Loader-Unloader-Pneumatic Conveyor for Chips.*

Sutherland Refiner Corp.: *Pulp Refiners—9.*

Swenson Evaporator Co.: *Lime Mud Filter.*

Waterville Iron Works: *Hammer Mill Rechipper for Kraft Chips.*

Westinghouse Electric Co.: *Switchgear, substations and motors.*

Williams Co.: *Hammer Mill for Chipping Box Ends; Hammer Mill for Rechipping Semi-Chemical Chips.*

Worthington Pump and Machinery Co.: *Causticizing Pumps.*

Chemical Suppliers

American Potash and Chemical Co.: *Salt Cake and Soda Ash.*

Dow Chemical Co.: *Caustic and Chlorine.*

General Chemical: *Alum and Acids.*

Hercules Powder Co.: *Rosin Size.*

Philadelphia Quartz: *Sodium Silicate.*

U. S. Lime Products: *Lime.*

Contractors

Antioch Building Materials: *Transit Mix Materials.*

Fair Mfg. Co.: *Misc. Iron.*

Ben C. Gerwick, Inc.: *Dredging.*

Healy Tibbits: *Underwater Pipelines.*

Judson Pacific-Murphy Steel Corp.: *Structural Steel.*

Macal Improvement Co.: *Grading and Leveling.*

C. C. Moore & Co.: *Power Plant Installation.*

Moore Dry Dock Co.: *Structural Steel.*

James A. Nelson Co.: *Piping Contractor.*

Pacific Electrical & Mechanical Co. and Fischbach & Moore, a Joint Venture: *Electrical Contractor.*

Paraffine Companies: *Paints, Roofing Materials.*

Plant Asbestos Co.: *Piping Insulation; Corrugated Asbestos Siding.*

Raymond Concrete Pile Co.: *Piling.*

Thomas Rigging Co.: *Rigging and Millwright Contractor.*

Swinerton & Walberg: *General Contractor.*

Viking Automatic Sprinkler Co.: *Fibre Protection Contractor.*

Wright Bros. Nursery: *Misc. Landscaping.*

D. Zelinsky & Sons: *Painting.*

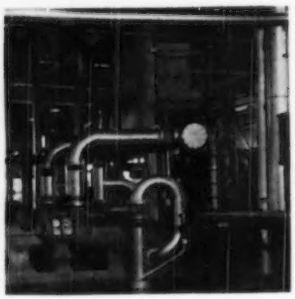
Shreveport's New Felt Mill

Bird & Son, Inc.

On Nov. 30, 1949, the first felt was produced at Shreveport's new Felt Mill, making good the prediction of Vice President Ralph A. Wilkins who had said that he'd have the mill operating on December 1st — two months ahead of the originally scheduled date of February 1, 1950.

Back of that first roll of felt were months of careful planning and just plain hard work on the part of everyone from Mr. Wilkins, Lester Tarbell, and L. L. Williams, to Mr. Steenhill and all of the fine crew from the Rust Engineering Company. During the last two weeks the efforts of these folks were bolstered and brought to final success by a crew of nine of Phillipsdale's and East Walpole's expert felt and paper makers. As soon as these men arrived at Shreveport they caught the spirit of the occasion and put in harder work and longer hours than they had ever known before so that the new mill would be producing felt by December 1. They succeeded so well that the very first reel of felt was *good* felt. It passed all inspection tests and went on to the Shreveport Roofing Mill where it was saturated and shipped to a customer.

Ground was broken and construction started on February 1st of last year. From the very start the work progressed rapidly and smoothly. Everything necessary for the felt making operations was in and ready for final adjusting and testing when the fellows arrived from the North on November 19th, a few days before



Noble & Wood Bulidog Jordans

Thanksgiving. Less than two weeks later the wheels were turning, producing a saleable product.

From the Ground Up

This mill has really been built "from the ground up." Even the six water wells on Bird property, furnishing five hundred thousand gallons per day, were part of the project. Likewise, a special railroad siding was built for the unloading of rags, wood and papers. The wood is stored alongside the tracks and the papers and rags on a large cement slab near the beater room.

For processing the rags there are two modern Taylor Stiles rag cutters with an exhaust system to carry away the dust. From the cutters the rags travel on a belt conveyor to three Dilts rag beaters with a capacity of seventy-five tons of felt production daily. For paper stock there is a Dilts breaker beater with provision in that area of the building for a hydrapulper later, when needed.

The wood converting equipment consists of a ten-knife chipper, a chip storage silo, chemipulper and a wood storage chest. The storage silo is built directly over the chemipulper. After passing through these operations the wood is blown by the exhaust steam directly to the wood storage chest.

Six concrete chests are provided for storing and mixing the stock—

One for rags
One for papers
One for wood
One for the machine, after rags, paper and wood have been blended and refined
One for dirty process water
One for clarified process water

Bird Machine Savealls

A unique process has been installed for clarifying the dirty process water. This water is a collection of all overflow, cooling and washup water from various parts of the mill. It can be used "as is" for the beaters, but for other purposes it must be cleaned. This is done by putting it through two Bird Machine Savealls. From these Savealls the clarified water goes to its storage chest for later use on Bird Showers, wet felt showers, screen showers and any other place where such water can be used. Thus a large amount of water is used over and over, being clarified each time at the Savealls. Any overflow from the clarified water chest and any other water too dirty for reclaiming goes through a thirty-five-hundred-foot sewer to the bayou of Red River.

The rag fibre goes from the three rag beaters to the rag storage chest and then is refined in a Noble and Wood Bull Dog Jordan. Wood fibre is refined by a Claflin. Rags, wood and paper are blended and further refined in a second Noble and Wood Jordan and these combined stocks then go to the machine chest.

After the machine chest comes a regulating box, then a settling system and then three Bird Screens. Rejected material from the Bird screens goes to a flat screen where dirt and other materials such as bits of rubber, cellophane and the like are removed and thrown away. The clean fibre is returned to the settling system. This method of settling and then screening

Aerial View of Shreveport Mill of Bird & Son

is a Bird & Son development which has proved very effective in delivering clean fibre to the felt machine.

The felt machine itself, to which the stock goes after passing through the Bird Screens, has one vat with a cylinder sixty inches in diameter and one hundred sixty-nine inches long. This cylinder transfers the fibres to a felt, just as on a regular cylinder paper machine, and the material then passes through three plain presses where most of the water is extracted. Next the product passes over twenty-seven 60-inch diameter driers, then through a five-roll calender stack. It is wound at the end of the machine on a two-drive reel, one reel supplying the re-winder as the other receives felt from the machine. Rewinding is done on a Langston rewinder. Although present felt requirements are largely for 144-inch felt, the machine can if necessary make a sheet of 155-inch width when trimmed.

A steam turbine located in the main lineshaft drives the machine. Thus, the machine operates on steam rather than electricity as at East Walpole and Phillipsdale. After the steam is used for power it is fed from the turbine directly to the paper machine driers and is used for drying the felt as it goes through the machine. This means a real saving in cost of power.

Natural Gas

The power plant which supplies the steam burns natural gas. The 250-pound steam pressure Riley boiler with a capacity of 30,000 pounds per hour furnishes steam for both the new Felt Mill and the Shreveport Roofing Mill as well.

The latest type Ross Vapor Absorption system is in use on the driers and over them is the latest type Ross hood. This system is heated by natural gas.

The starting equipment—the relays, starters and other electrical gadgets which often cause endless trouble in the wet conditions of a paper mill—are all concentrated in three dry, clean load centers. Push button controls at

Machine Room Basement showing Stock Pumps

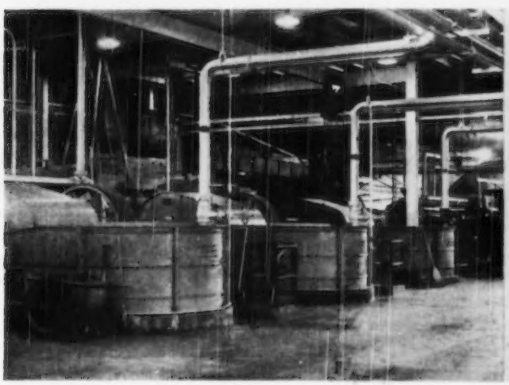
motors throughout the mill thus operate these starters by remote control. In other words, the expensive electrical starting equipment is kept clean and dry so that it does not get out of order so frequently; and when it does need attention, it is a place easy to get at and easy to work on. The whole set-up is an electrician's dream come true.

Other units of the new mill include modern locker rooms, a new combined storeroom for both mills and a new machine shop which likewise serves both mills. Finished felt is stored at the end of the machine room and when necessary can also be stored in a section of the beater room.

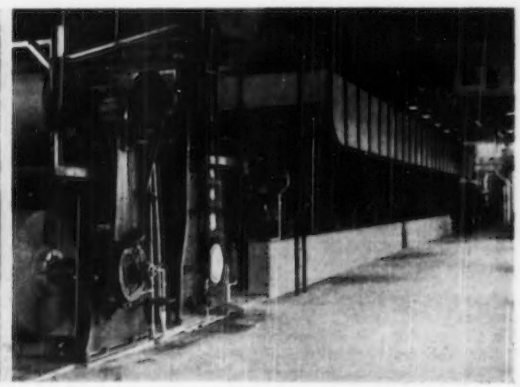
Under Paper Division

The new Felt Mill, as already indicated, comes under the direction of Vice President Ralph A. Wilkins who is in charge of all paper and felt operations at Bird & Son. Locally the plant will be operated by L. L. Williams, Southwestern Manager; B. P. Soward, Superintendent, and Neill McNeill, Assistant. The same foremen and other supervisory personnel will be used to operate both the new Felt Mill and the Roofing Mill.

In addition to Messrs. Wilkins and Tarbell, those from New England who went to Shreveport to help get the wheels turning were: Frank Massey and Kimble McEwen of East Walpole and Helge Holter and Clarence Pierson of Phillipsdale on the Paper Machine; William Kanoski, Phillipsdale, on rags; Joseph Ferreira, Phillipsdale, on wood and paper; Oscar Lambine, Phillipsdale, on power and Donald Ross and Domenic McKenzie, East



Dilts Beaters in Foreground, Felt Machine at Rear



Beloit Cylinder Felt Machine

Walpole, on the winding operations. Most of these men stayed until just before Christmas to help train the regular Shreveport operators. Some of them returned after Christmas to give further instruction and counsel until it was certain that all operations were running smoothly.

The Shreveport Felt Mill, only an engineer's plan and a draftsman's blueprint in January, 1949, is now the newest operating unit of Bird & Son, Inc. It's one we can all be proud of—and none more proud than the Shreveport managers and crews who are now turning out their own felt production to help supply the demand for Bird Shingles, Roll Roofings and Saturated Felts in the busy Southwestern area.

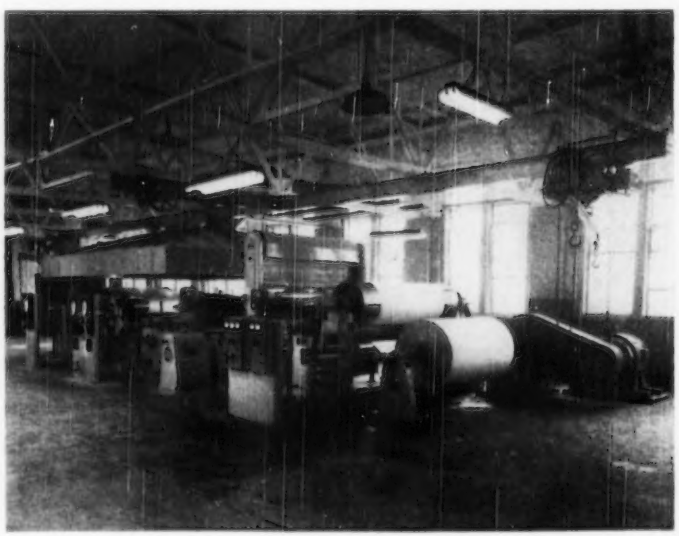
List of Equipment and Suppliers

Air Compressor: Gardner Denver Co.
Beaters: Dilts Machine Works
Boiler: Riley Stoker Corp.
Boiler Controls: The Bailey Meter Co.
Chemipulper: Paper & Industrial Appliances, Inc.
Chest Agitators: Dilts Machine Works
Chip Handling Equipment: Link Belt Co.
Claflin Refiner: Hermann Mfg. Co.
Consistency Regulator: Bird Machine Co.
Deaerator Heater: Dravo Corp. (Cochrane Corp.)
Dryer Drainage System: Midwest Fulton Mach. Co.
Dryer Doctors: Bird Machine Co.
Electric Hoist: Yale and Towne Mfg. Co.
Felt Conditioners: Bird Machine Co.
Flat Screen: Improved Paper Mach. Corp.
Jordans: Noble and Wood Machine Co.
Knife Grinder: Rees Machinery Co.
Lift Trucks: Clark Equipment Co.
Machine Drive Turbine: General Electric Co.
Motoreducers: The Falk Corp.
Motors: G. E. and Westinghouse
Paper Machine rebuilt by: Beloit Iron Works
Permanent Magnetic Roll: Stearns Magnetic Co.
Pumps: Warren Steam Pump; E. M. Cross Co.; Beloit Iron Works; and Nash Engineering Co.
Rag Cutters: Taylor, Stiles & Co.
Reconditioning Dryers: Pusey & Jones Corp.
Reel: Beloit Iron Works
Scales: Toledo Scale Co.
Steam Flow Meter: The Foxboro Co.
Stock Screens: Bird Machine Co.
Switchgear: I. T. E. Circuit Breaker Co.
Vapor Absorption System: J. O. Ross Engineering Corp.
Water Treating Equipment: Elgin Softener Corp.
Winder and Slitter: Samuel M. Langston Co.

Waxing Machine at Hollingsworth & Whitney Co.

The Hollingsworth & Whitney Co. with main offices in Boston, Mass., has installed at their Waterville, Maine, Plant a new 84" Dilts Miami Lo-Type Waxing Machine. Being of the very latest design and incorporating a number of very interesting features, it is one of the most modern waxing machines to be found anywhere in the industry.

Mechanically, the machine is capable of sustained speeds in the order of 1500 FPM. It consists of a single shaft type unwind stand with Kohler runningbelt tension, a two roll waxing section with hot roll, a three roll waxing section, reversible to permit use of either the top nip or the bottom nip, a water finish attachment, a two roll cooling section, and a shaft type center winder. The waxing sections employ the squeeze roll principle of wax application and control. Loading and lifting of the top squeeze rolls is controlled through the use of air cylinders and Foxboro controls. Temperature control units are provided for maintaining uniform wax temperatures in the two wax baths. The drive for the machine is a Reliance multimotor V-S unit with individual motors on each section driving to the sections through V-belts and sheaves. Through the use of an unwind drag generator at the unwind section operating in conjunction with Kohler running belt tension and a variable voltage DC motor at the rewind section, either constant tension or tapered tension, absolutely uniform at all times, is possible insuring properly wound rolls. Stall tension also is provided for.



H. R. MacMillan Export Co., Ltd.— Pulp Division

E. P. McGINN[1]

On June 5th the newest and probably the most modern kraft pulp mill on the North American Continent began operation. The digesters were started with liquor made of purchased sodium sulphide and caustic soda. The recovery system reached full operation on June 18th.

The mill is located on the south side of Northumberland Channel on Vancouver Island, about seven miles south of Nanaimo by road and four miles by water. It is seventy miles north of the capital city of Victoria, in a locality noted not only for its beautiful scenery but also for its mild and temperate climate. The trip from Vancouver to Nanaimo can be made in 2½ hours via the Canadian Pacific Steamship ferry service, or in 20 minutes by Queen Charlotte Airlines. A paved road, much of it built by the company, connects the mill, with both the airport and the town.

[1] Industrial Editor, Paper Trade Journal.

This bleached kraft pulp mill which cost $19 million to build, is the latest step in a wood-utilization programme which has been carried on for many years by H. R. MacMillan Export Co., Ltd. Founded in 1919, the company trades in world markets on its own account and through subsidiaries carries on functions of timber holding, logging, sawmilling, plywood manufacturing, shipping and selling coniferous wood products of the Pacific Northwest.

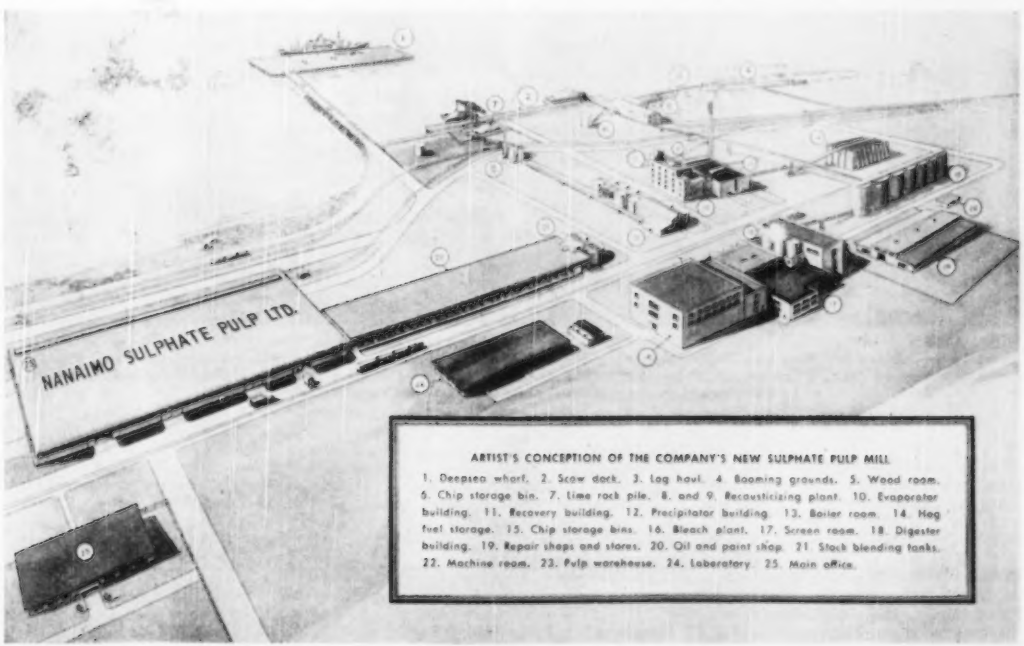
The company is owned by about 3,300 shareholders, a substantial proportion of whom are officers and employes. Almost 68 percent are residents of British Columbia.

Solely a merchandising company at its inception in 1919, the company has integrated with its largely expanded sales organization the most extensive timber holding, sawmilling and plywood manufacturing industry in Canada.

The company produces about 50 percent of B. C.'s annual output of Douglas Fir plywood from two plants with production at the rate of 120 million sq. ft. of ⅜" plywood annually, while the total production by sawmill units exceeds 300 million FBM annually.

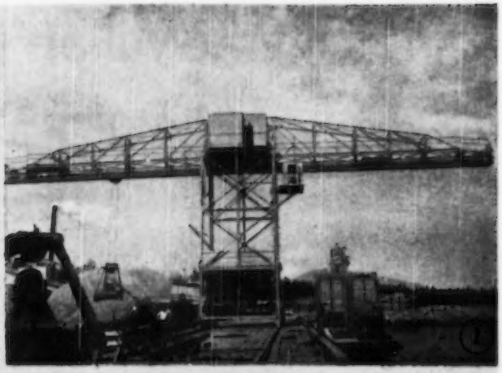
The H. R. MacMillan Export Co., Ltd. now includes the following divisions: Alberni Pacific Lumber Division; Albert Plywood Division; Alpine Timber Division; Canadian White Division; Log Supply Division; MacMillan Industries Division; Northwest Bay Logging Division; Shawnigan Lake Lumber Division; Victoria Lumber Division; Pulp Division. Although the Pulp mill is capable of handling full sized logs in its own wood plant, it is planned to use the chips made from slabs, edgings and other waste material from the various MacMillan saw mills.

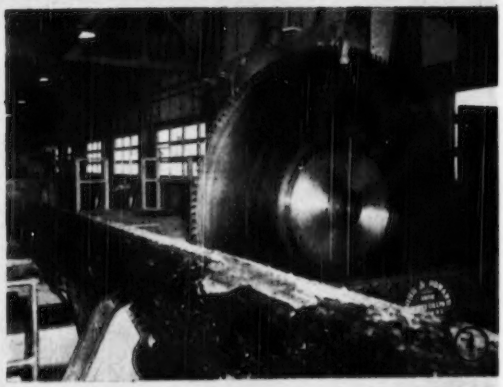
As one of the pioneers in the field of forest conservation, the company several years ago began investigating the possibility of utilizing the waste products incidental to saw mill operation. These waste products consist

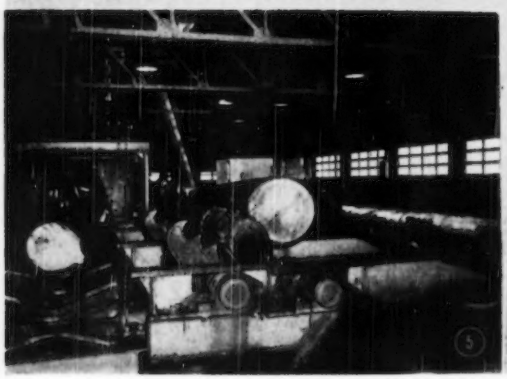


ARTIST'S CONCEPTION OF THE COMPANY'S NEW SULPHATE PULP MILL

1. Deepsea wharf. 2. Scow dock. 3. Log haul. 4. Booming grounds. 5. Wood room. 6. Chip storage bin. 7. Lime rock pile. 8. and 9. Recausticizing plant. 10. Evaporator building. 11. Recovery building. 12. Precipitator building. 13. Boiler room. 14. Hog fuel storage. 15. Chip storage bins. 16. Bleach plant. 17. Screen room. 18. Digester building. 19. Repair shops and stores. 20. Oil and paint shop. 21. Stock blending tanks. 22. Machine room. 23. Pulp warehouse. 24. Laboratory. 25. Main office.







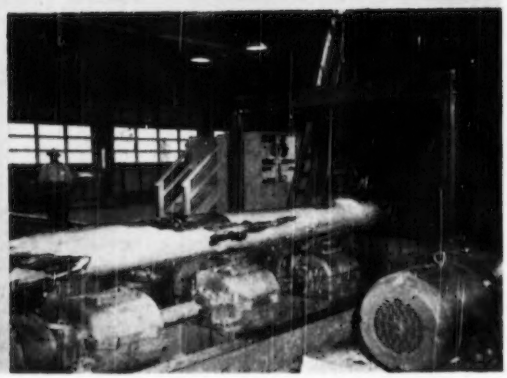


Figure 1—View of Log Raft from Scow Dock, Gabriola Island in Background. Figure 2—Traveling Gantry Crane and Scow Wharf. Figure 3—Log Haul and Wood Room. Figure 4—Cut-Off Saw, 8 ft. 6 in. in diameter. Figure 5—Live Deck at Right. Hydraulic Barker Feed Rolls and Entrance at Left. Figure 6—Clean Log Emerging from Hydraulic Barker.

of bark and sawdust, slabs, edgings, and planer shavings and trimmings. Company officials studied the problem with Dr. J. S. Bates, Dr. E. C. Jahn, and E. S. Fellows. Dr. Bates is manager of Price & Pierce, Ltd. for Canada and was formerly superintendent of the Forest Products Laboratories of Canada. His long experience in the pulp and paper industry includes contacts with plants in the United Kingdom and Northern Europe.

Although the mill is rated at 225 tons per day capacity, it has been designed and laid out to be doubled economically if desired.

The complete design, supervision of construction, and starting up of the plant was in charge of Howard A. Simons, Consulting Engineer of Seattle and Vancouver, B. C., who has an enviable record for the design and construction of mills of this type.

The consulting engineer's organization consisted of a staff of engineers, draftsmen, purchasing and cost control departments, who, under the direction of Mr. Simons, were responsible for the preparation of the plans and the purchasing of all materials,

cost control, expediting of all equipment and material, warehousing and accounting for the entire job.

The construction labor was supplied and supervised by the B. C. Bridge & Dredging Co., of Vancouver.

At present a large quantity of chips is coming from the company's Victoria Lumber Division at Chemainus and from Canadian White Pine Co. Ltd. Division in Vancouver. These mills are equipped with hydraulic barkers and chippers. Thus the logs are barked before being sent through the saw mill. The slabs, edgings and other waste materials are then sent through the shipper. Chips are brought by barge to the pulp mill at Harmac, B.C.

Eventually it is planned to have hydraulic barkers and chippers at all of the MacMillan Lumber Mills so that the pulp mill will be able to operate almost entirely on chips from these plants. In addition to chips for pulping, these mills also supply hogged fuel for use in the boilers. There is no pulp mill in the world which is better situated for a permanent supply of good pulpwood.

The mill site was excavated from what was originally a high, rocky coast line. This involved the drilling, shooting and removal of a large amount of rock, most of which was used for fill-in the areas below the set grade, and some to build a roadway to the main wharf and car ferry slip. Most of the buildings are built directly on the rock ledge that remained after removal of the upper portions. The mill is in an excellent location for shipping its products and receiving its raw materials by boat. The harbor in front of the mill is sheltered and deep enough to accommodate the largest ocean vessels. Within the next few months the dock will be completed to allow handling of shipments directly to these large ships. Many of the raw materials are received in freight cars transported from the mainland in car barges which dock at the company-owned Car Barge Slip, designed to permit railroad cars to be loaded onto or brought ashore from the mainland ferry service connecting with all trans-continental rail lines.

This slip consists of two rectangular wooden towers mounted upon concrete piers and set some twenty feet off shore. Between the towers is suspended a 36 foot wide apron with a wood deck, upon which is laid the railroad tracks. The apron is hinged on the shore to allow adjustment for the various tide conditions by winches and counterweights located in the towers. The tracks extend from the apron to the mill railroad track system.

Raw Materials Handling

The freight cars are unloaded at the Scow Wharf where material is transferred in conveyors to the various storage spaces. The Scow Wharf is 500 ft. in length by 40 ft. wide and is built upon creosoted piles driven into gravel fill. An underwater trench into which creosoted piles was driven was excavated in the rock along the entire length of the wharf to carry the 5-ton crane used for unloading purposes.

The crane is of the double cantilever hammer head type with a boom 145 feet in length capable of reaching 64 feet in either direction. The height above the deck is 45 feet to the underside of the carriage.

The bucket is of special design with a capacity of four cubic yards. When unloading at full capacity at the designed speed of 32-second cycle, it can handle nearly 60 units per hour or 12,000 cu. ft. of pulp chips or hog-fuel.

Sensitive dynamic braking of the latest type is used to ensure fast lowering of the bucket with rapid deceleration at the end of the drop in order to minimize damage to the Scow decks.

A hopper nested in the crane structure discharges by means of a short conveyor, also mounted on the crane, to a conveyor system for either hog fuel or chip handling.

Pulpwood Handling

Pulp logs are brought to the mill in large rafts which are taken apart in the log pond and fed to the log haul which takes them up to the wood room. Better grade sawlogs are sorted out and rafted to the sawmill. The log haul drive is equipped with a two speed reduction gear, allowing it to be operated at slow speed for large logs and fast speed for small logs.

As each log leaves the top of the log haul it is gripped by the clamping jaws and cut into 26 foot lengths by 8½ ft. diameter cut-off saw.

The cut logs are then kicked to the live log deck which carries them to the barker feed rolls. Here the logs may be turned over for removing limbs or other protrubences.

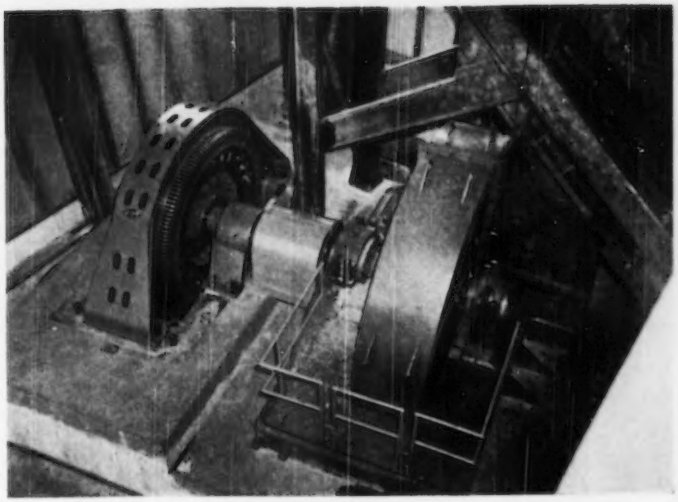


Figure 7—Sumner Iron Works 15.3 in. Chipper with 1500 H.P. Electric Machinery Motor.

Hydraulic Barker

The hydraulic barker which is a new type, designed by H. A. Simons, takes the logs through the barker without turning them.

The Hydraulic unit straddles the log, one head unit above the log and one below. Each unit consists of a pair of nozzles, one mounted at each end of a header welded to a tubular shaft into which the water is delivered.

The shaft is rotated by V-belt drive from a D.C. variable speed motor. The effect is that as the pair of nozzles is spun on a horizontal plane, the log being carried past the jets receives the impact of the water in a progressive circular pattern. The upper head is raised and lowered to suit the size of the log by hydraulic motor. Water at 1500 PSI is supplied to the nozzles at the rate of 600 gallons per minute by two Bingham multi-stage centrifugal pumps.

Upon emerging from the hydraulic barker the logs pass to another live deck which takes them to the chipper feed conveyor.

Chipping and Chip Handling

The chipper, which was built by Suzner Iron Works, has a 153" disc with six knives. It is driven by a 1500 H.P. synchronous motor connected to the disc through a Thomas flexible coupling and handles logs up to 26 ft. long and 34 in. dia.

From the chipper the chips drop to a conveyor which carries them to a surge bin which evens out the flow to the chip screens.

Chips are reclaimed from the surge bin by means of a Link-Belt star feeder which feeds the three vibrating chip

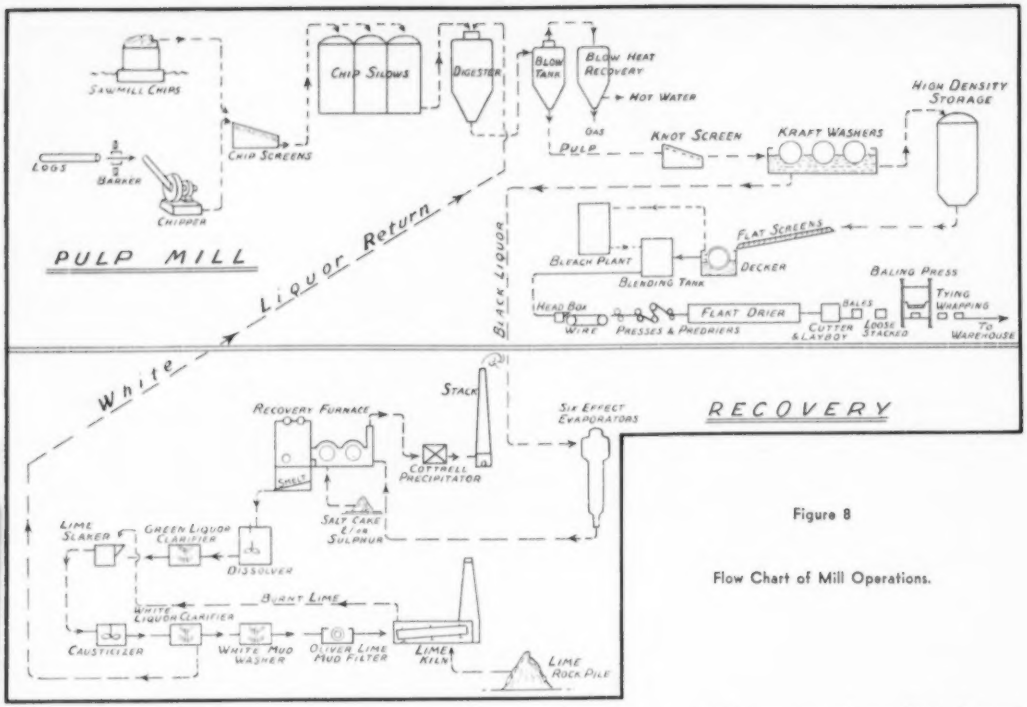


Figure 8

Flow Chart of Mill Operations.

screens. All chips used in the mill must pass through these screens. Fines from the chip screens are sent to hog fuel storage and oversize material is put through a rechipper and returned to the screens. Accepted chips are carried on a 30" belt conveyor to the chip storage bins where they are sent into any one of the seven silos by a Link-Belt tripper. These silos are unusually large and impressive, poured concrete monoliths, each 72 feet high, 40 feet I.D., and holding approximately 275 units of chips.

Conical steel hopper bottoms and Link-Belt rotary plate chip feeders, on each silo, transfer the chips to a rubber belt conveyor which carries them over a Merrick Weightometer and thence to the digester being loaded. A Link-Belt tripper shunts the chips into the proper digester.

Digesters

There are four Inglis digesters, each 11½ feet diameter by 53 feet high. Each outer shell was constructed of welded mild steel plates and then stress relieved. A lining of No. 316 stainless steel, 7/64 inches thick, was resistance welded by an automatic welding machine designed by the digester manufacturer, The John Inglis Co. and The A. O. Smith Co.

Each digester is equipped with an Esso liquor circulating system, complete with heater, strainer and pump capable of handling 2100 U. S. gallons per minute. This equipment is of stainless steel throughout. Black and white liquor flows into the digesters through overhead measuring tanks.

Each digester produces approximately 12 tons of pulp per cook, on a cooking cycle of 3¾ to 4½ hours. During the first weeks of operation the production was about 175 tons per day, but was soon raised to 225 tons/day.

The blow tank is 26 feet diameter by 21' 6" straight side height with bottom cone 21' 4" high. The top section is a frustum 10' 5" high surmounted by a 14 foot diameter by ten feet high cylinder. In the top cylinder are located the connections for the heat recovery system. The tank is mounted on steel columns, with the lowest point six feet from the floor level, the space underneath being occupied by the drive mechanism for the agitator in the bottom cone. The blow tank capacity is about 20 tons of pulp or 2½ digester blows.

Gases from the top of the blow tank are carried through a 48 inch diameter pipe to the heat recovery unit consisting of a jet condenser and a hot water tank vented to the atmosphere. This contaminated hot water passes through a filter followed by two heat exchangers. The clean water, thus heated, flows to a storage tank from where it is drawn as needed for brown stock and bleached stock washing and dilution.

Pulp Washing & Screening

Pulp from the blow tank is pumped up to the brown stock washing system which consists of two Bird Jonsson knotters in parallel, (a third knotter is now being installed), followed by three Sherbrooke vacuum washers, with cylinders eight feet diameter by 14 feet long. The washers are arranged in series with a separate filter seal tank for each. The primary seal tank is 30 feet diameter by 30 feet high and the secondary and tertiary tanks are 25 feet diameter by 30 feet high. Black liquor from the strong filtrate tank is pumped to the third liquor storage tanks. Set seal tanks are connected in parallel to a foam breaker tank 20 feet diameter by 40 feet high to break down any accumulation of foam.

Pulp from the third stage washer at 12-15 per cent cons. is carried by belt conveyor to the three high density storage tanks, these tanks are 20 feet diameter at the top and 21 feet diameter at the bottom with straight sides 39 feet high and a cone bottom equipped with an agitator. The slight taper in the straight side is to prevent the heavy stock from clinging to the sides. The tanks are made of Douglas Fir tank stock cut at the company's mills except for the cone bottom which is steel with heresite lining.

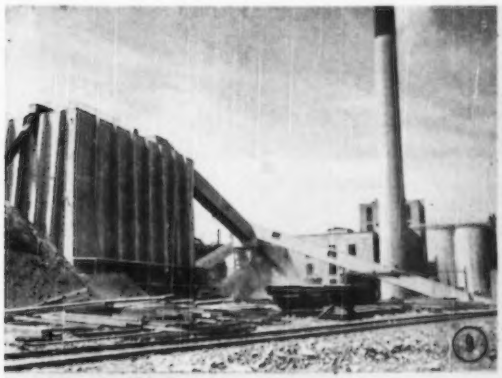
Pulp from these storage tanks passes through a consistency regulator and stock meter and is then diluted for screening. Twelve lines of flat screens are divided into unbleached and bleached pulp groups with two lines of tailing screens. Screened pulp is thickened on four deckers and then dropped to the brown stock storage chest be-

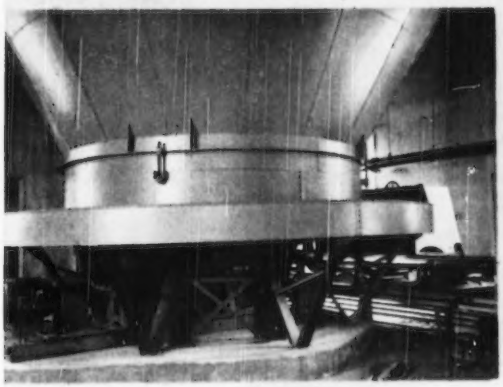
fore it is pumped to the blending tank near the pulp machine room. When the bleaching plant is in operation, pulp will then be pumped from this point to the first stage of bleaching.

The blending tank is 30 feet high overall and 38 feet I.D. The bottom cone is made of tile lined concrete and the straight sidewalls are made of Douglas Fir Staves. The agitator consists of two propellors on a vertical shaft with the lower one being centered in a diffuser ring in the bottom cone, the agitator drive is suspended on girders over the tank and consists of an A.C. motor with double reduction gears.

Pulp Drying Machine

The pulp drying machine consists of an Inghs Fourdrinier and Heavy Press Section followed by a Flakt Dryer and Lamb-Grays Harbor Slitter-Cutter-Layboy, conveyors and hydraulic press. The Fourdrinier has a wire 178" wide, 80 feet long, provided with a fully adjustable Projection Slice. There are 26 seven inch diameter rubber covered table rolls, six 12" wide suction boxes with cross oscillation, dandy roll, rubber covered return wire rolls, bronze breast roll, 36" double suction





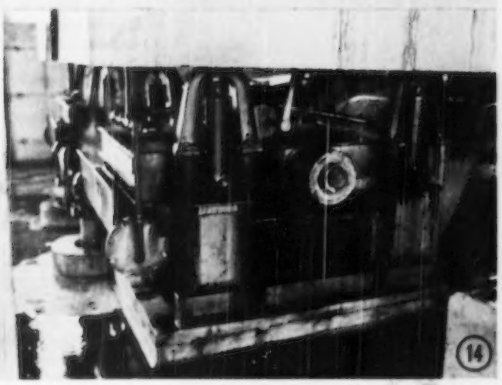
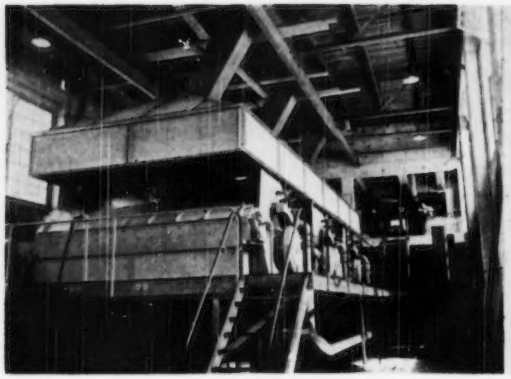


Figure 9—Hog Fuel Storage Bin at Left, Recovery Plant Right Background. Figure 10—Four of the Seven Chip Bins are Visible. Others are Behind Hog Fuel Storage Bin at Right. Extra Hog Fuel is Shown in Foreground. Extra Chips at Left Rear. Figure 11—Link-Belt Rotary Plate Chip Feeder at Bottom of Chip Bin. Each Bin is Equipped with One of These. Figure 12—Digester Loading Floor. Figure 13—Digester Blow Tank and Heat Recovery Unit. Chip Conveyor is Overhead. Figure 14—Two Bird-Jonsson Knotters.



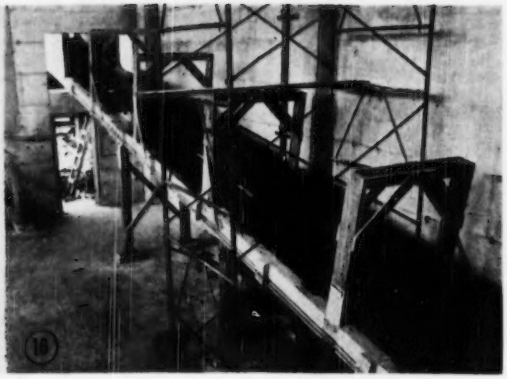


Figure 15—Sherbrooke Three-Stage Vacuum Brown Stock Washing System. Figure 16—Belt Conveyor Carries High Density Washed Stock to Storage Chest.

box suction couch having two, pneumatically loaded, grooved, rubber covered presser rolls. The table roll rails are cased with Monel metal and the Saveall tray is of fabricated stainless steel. A Nash wire guide controls the wire alignment.

The press section consists of three main presses with bronze jacketed top rolls and rubber covered bottom rolls. The sheet passes straight through without reversing. Press frames are of fabricated steel and loading is applied by pneumatic cylinders. Pressures are controlled automatically to set valves which are recorded on charts on the control and instrument panels.

Two pre-heat dryers, 60" diameter, mounted upon anti-friction bearings are located ahead of the third press. Their function is to increase the temperature of the water in the sheet, to lower the viscosity, and thereby allow its escape from the sheet in greater volume in the final pressing operation with consequent reduced steam consumption in the drying operation.

Figure 17—High Density Washed Brown Stock Storage Tanks.

Each press felt is equipped with one suction box and one shower pipe for cleaning the felt. All felt rolls are rubber covered. All rolls in the Fourdrinier and press sections are balanced for a surface speed of 250 f.p.m. and bearings are anti-friction throughout the machine.

Doctors are Lodding type, with those on the breast and return wire rolls mounted on stainless steel angles. The top press roll doctors are oscillated. An overhead crane runs the full length of the machine wet end.

From the third press the sheet passes into a horizontal type H "Flakt" dryer. This Canadian-built dryer which is the largest of its kind in operation at this time, consists of a system of horizontal conveyors carrying the pulp back and forth the entire length of the enclosed drying chamber, entering on the bottom conveyor and leaving from the top conveyor. The pulp is thus carried through horizontal air channels separated by partitions of steam coils. The group of circulating fans at the center portion of the dryer forces a powerful air current through these channels in such a manner that the direction of the air current over the pulp web varies from deck to deck.

Water evaporation in the dryer, is obtained by forced air circulation through the multiple fan housings. One of these housings is placed on each side of the center of the dryer and each contains 18 double fans. Preheated air is supplied by a heat exchanger and fan.

From the end of the Flakt dryer the pulp sheet passes directly to a Lamb-Grays Harbor heavy duty slitter-cutter-layboy. The slitter and cutter part of this machine is on an elevated platform several feet from the floor. This allows room for rather high stacks of sheet in the layboy thus avoiding trouble if delays occur in the baling operation.

The sheets are counted and automatically separated into the correct number for each bale. These stacks are dropped to a roller conveyor and moved to the 800 ton hydraulic baling press. This machine has an unusually powerful hydraulic pump to allow high speed operation of the press.

Bales from the press move down a roller conveyor where they are wire tied and then loaded onto skids which are carried to the shipping platform or pulp storage warehouse by Ross heavy duty lift trucks.

The pulp machine building is constructed of reinforced concrete, except for the North side adjacent to the front, or operating side of the pulp dryer. This side is constructed of Douglas Fir lumber and siding which may be easily removed to allow for future expansion.

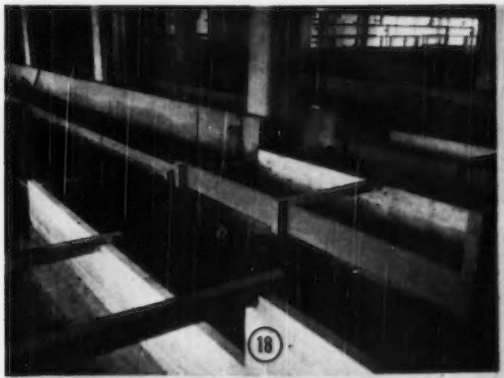
Pulp Storage

The pulp storage building is constructed entirely of wood with the exception of the foundations and is 300 feet long by 160 feet wide and 21' 6" high to the underside of the trusses. The base area is 48,000 sq. ft. with a storage floor area of 43,000 sq. ft. and 841,000 cu. ft. of storage space, which will hold 8,000 tons of baled pulp. The additional 5,000 sq. ft. of base area is occupied by an indoor railroad siding and loading platform running the full length of the building.

Bleach Plant

The bleach plant is now under construction and is scheduled for operation by January 1951. When completed, it will consist of eight bleach cells, four Sherbrooke vacuum washers, four Oliver vacuum washers, three high density storage tanks and a chlorine dioxide production plant.

The bleach cells are steel towers, tile lined by Stebbins Engineering. Six of the vacuum washers are rubber lined and two are built entirely of stainless steel. The three high density storage tanks will be used for storage of the high density bleached pulp from the last washer and are identical to those as previously described for storage of high density unbleached stock except that the steel bottom



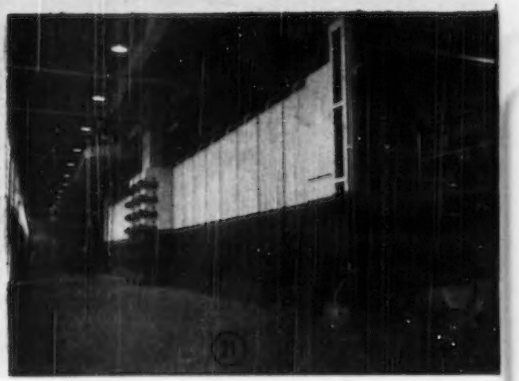


Figure 18—Unbleached Flat Screens at Left. Bleached Flat Screens, Right Rear. Figure 19—Inglis Fourdrinier and Press Sections of Pulp Dryer. Figure 20—Pulp Dryer Control Panel. Figure 21—Flakt Dryer Section of Pulp Dryer.

cones of the bleached stock tanks are lined with rubber instead of Heresite.

Pulp to be bleached is pumped from the brown stock storage chest through a consistency regulator and stock meter and thence to the first chlorinating cell.

Fully bleached pulp from the high density storage tanks is pumped to the flat screens from where it goes to the deckers and then to the bleached stock storage chest.

Chlorine Dioxide Production

This bleaching plant will be the first on the North American Continent equipped to produce and use chlorine dioxide in the process.

Chlorine dioxide will be made by a process developed at the Mo Och Domsjo sulphate mill in Sweden. The main features of the process are as follows:

Combustion gases containing 10 to 15 percent SO_2 from a sulphur burner, are introduced in the bottom of each reaction tower below a number of draft tubes. A solution of Sodium Chlorate flows from the top of the tower. The sulphur dioxide reduces the chlorate, forming chlorine dioxide and small amounts of hydrogen chloride and free chlorine. The reaction temperature is kept at about 30° C by means of a cooling coil and the rate of Cl O_2 production is regulated by means of the added SO_2. If the production is to be discontinued, the supply of SO_2 is simply cut off. When all chlorate is used up, the chlorine dioxide still remaining in solution is reduced with an excess of sulphur dioxide.

The chlorine dioxide gas thus formed is introduced in the bottom of an absorption tower where it is absorbed in cold water.

Gases discharged from the top of the absorption tower are pulled through a small auxiliary tower where any unused chlorine dioxide, or acid fumes, are absorbed in milk of lime, to prevent contamination of the surrounding atmosphere. A fan connected to the discharge of this small tower also creates a slight vacuum on the entire absorption system thus avoiding leakage of chlorine dioxide into the building.

The chlorine dioxide solution from the absorption tower is collected in two storage vessels, whence it is pumped to the bleach plant. The Cl O_2 yield, figured on chlorate consumed, amounts to about 90 percent and the content of available chlorine in the chlorine dioxide solution to the bleach plant approximates 16-17 grams per liter.

Recovery System

Black liquor is pumped from the

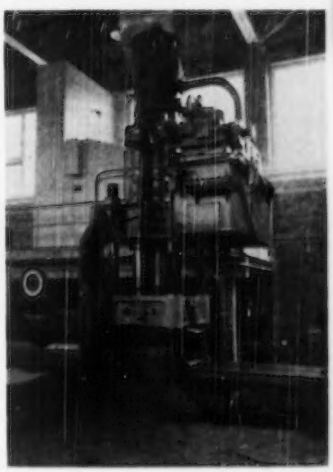


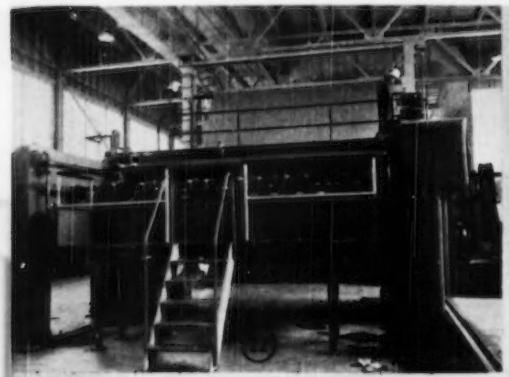
Figure 23—Baldwin Southwark Baling Press.

black liquor storage tank to the multiple effect, long tube, vertical, film type evaporator manufactured by John Inglis Co.

It consists of six bodies operating in sextuple effect economy together with the surface condenser on the last effect. The capacity of concentration is from 15 percent solids to 55 percent solids with 152,000 lbs. of water evaporation hourly. The design is on the basis of using 40 p.s.i. steam to the first effect.

Liquor piping is arranged for divided liquor feed to the fifth and sixth effects with subsequent flow to the fourth, third, second and first effects, from where the concentrated liquor is discharged to storage. The first effect is arranged for multiple pass liquor flow over the heating surface. Liquor is transferred from one effect to the other by stainless steel (Worthite) pumps with direct motor drive. All piping is installed with complete by-passing connections for each body.

In general, the evaporator and condenser are of all welded steel construction and they are supported at the vapour heads. The tubes in the second, third, fourth, fifth and sixth effects are of carbon steel. The tubes in the first effect and the surface condenser are



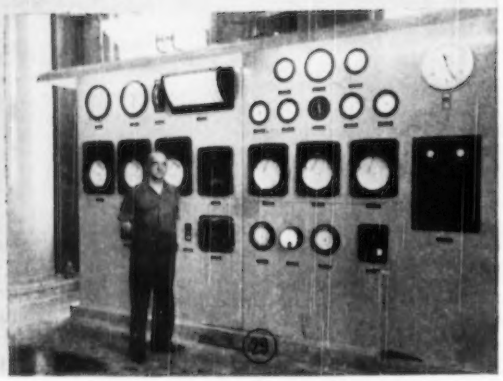


Figure 22—Lamb-Grays Harbor Slitter-Cutter-Layboy. Figure 24—Ross Carrier Heavy Duty Lift Truck Placing Bales of Pulp in Warehouse. Figure 25—Lawrence Harris, Mill Superintendent, with some of the First Bales of Pulp Produced in the New Mill. Figure 26—Indoor Railroad Siding and Loading Platform. Figure 27—Bleach Plant Under Construction. Figure 29—Control Panel of Combustion Engineering Recovery Furnace.

of Type 304 stainless steel. Outside centrifugal type catchalls are provided for each of the six bodies.

The steam condensate passes through a flash system and is pumped to the plant condensate storage. The contaminated condensate is removed through an accumulative flash system consisting of flash tanks and liquid level control valves and piping, to a single condensate pump.

Heavy liquor from the evaporators is pumped to a four-wheel, cascade type evaporator, which raises the solids to about 70 percent before it flows to the mixing tank where make-up salt cake is added. The liquor then goes through primary and secondary liquor heaters before being sprayed into the recovery furnace.

The recovery furnace proper is a combustion engineering spray type, with a design pressure of 675 pounds per square inch and a working pressure of 350 PSI; it has a heating surface of 20,518 sq. ft. and is designed to produce 125,000 lbs. of steam per hour from 32,200 lbs. of dry solids per hour. Both forced and induced draft fans are used and the waste gases are passed through an electrostatic precipitator, with the recovered solids being returned to the cascade evaporator.

From the recovery furnace, smelt drops into the enclosed dissolving tank where it is dissolved in weak liquor from the lime mud and dregs washers. Green liquor from this tank is pumped to the green liquor clarifier which is part of the Dorr continuous causticizing system. The green liquor clarifier is a three-tray four compartment balanced tray thickener, with all compartments operated in parallel. Mechanically driven revolving arms, equipped with rake blades, convey the settled material to a discharge point at the center of each compartment. Overflow pipes are so placed in each compartment that equal amounts of clear liquor are continuously withdrawn. The solid material passes downward through boots until it reaches the bottom tray, where it is withdrawn by a single pump and sent to the dregs washer.

The Dorr green liquor clarifier is constructed to provide maximum resistance against corrosion and insure long life for the equipment. Anti-corrosive features include stainless steel feed box, stainless steel collar around the shaft at liquor level, and extra-heavy plate construction on the tank and trays.

Clarified green liquor flows to the Dorreo slaker where it contacts the milk of lime. This slaker is of heavy steel plate construction with stainless steel shaft and impellors, rake stringers and blades.

Overflow from the slaker passes through three causticizers each 10 feet high by 10 feet diameter connected in series. These units are equipped with stainless steel shafts and impellors.

From the causticizers, the liquor passes to the white liquor clarifier which is identical in construction and operation to the green liquor clarifier previously described. An unusual feature of this system is that the overflow from the white liquor clarifier passes through a fourth causticizer before going to white liquor storage.

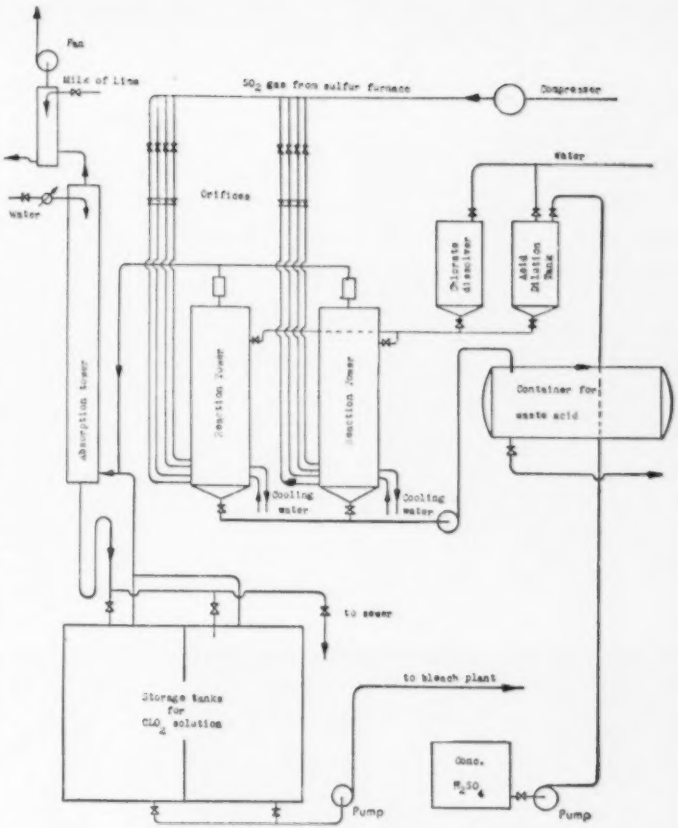


Figure 28—Flow Chart of Chlorine Dioxide Production System.

Lime mud drawn from the bottom of the white liquor clarifier is sent to the lime mud washer which is a three-tray thickener similar to the white liquor clarifier. However, it is operated with the top two and the bottom two compartments in parallel, with both halves connected in series. In this way, two stages of washing are achieved, the first stage being carried out in the top compartments and the second in the lower. If necessary, the top two compartments may serve as a white liquor clarifier, and the bottom two provide a single stage of mud washing. A motorized lifting device for the rakes is provided on both the white liquor clarifier and the lime mud washer. This eliminates shutdowns when overloads are encountered, as the rake blades can be raised clear and then lowered slowly to reduce the overload.

Effluent from the vacuum mud filter is used as wash water in the lime mud washer. Overflow from the washer is sent to weak liquor storage. Sludge from the mud washer is sent to the Oliver vacuum mud filter. Sludge from the filter drops into a screw conveyor which carries it into the lime kiln. Make-up lime is added in the form of crushed limestone which is added to the kiln with the filter sludge.

Another unit in the Dorr system is the dregs washer which receives the underflow from the green liquor clarifier. This underflow contains sufficient soda to require washing before being discarded. This reclaiming operation is accomplished in the Dregs washer, the underflow from which contains a negligible amount of soda and is discarded. The wash water, as mentioned above, is returned to weak liquor storage prior to being pumped to the smelt dissolver.

The dregs washer is normally a four-compartment washing tray thickener which provides four corresponding stages of counter-current decantation washing. It is arranged with the compartments in series, so that the dregs are given four sucessive washings. Solids pass downward, compartment by compartment, against a

counter flow of wash solutions, and finally of fresh water. Thus, the solids transfer their dissolved soda values to the wash solution and are finally removed by a diaphragm pump from the bottom compartment virtually free from soda.

The lime kiln is seven feet in diameter by 250 feet long and is oil fired. Burned lime is conveyed to a storage silo from where it is removed as needed and sent to the slaker.

Steam Plant

Since electric power is purchased from British Columbia Power Commission, no generators are necessary and all of the steam requirements are for manufacturing processes.

In addition to the recovery boiler which has a capacity of 125,000 lbs. of steam/hr, there are two hogged fuel boilers each having a capacity of 75,000 lbs. of steam/hr. Like the recovery boiler, these units were also built by Combustion Engineering Company. In addition to burning hogged fuel these boilers are also equipped to burn steam-atomized fuel oil.

Each boiler has a dutch oven for hog fuel firing, with 240 sq. ft. of grate area divided into three 8 ft. x 10 ft. cells with division walls between them. Each cell is separately fired through one feed-hole in the roof and fed by chute from an overhead flight conveyor. Rate of feed is controlled by gates.

There are no superheaters but the recovery boiler has an economizer. The air heaters on the steam generators are of the tubular type of large capacity, capable of pre-heating air to approximately 535° F. Forced Draft and induced draft fans are turbine-driven with auxiliary motor drives for shut-down loads. The forced draft fans are controlled by inlet vane control, the induced draft fans have outlet louvre dampers.

The recovery boiler has motor driven fans, the induced draft fan being provided with a variable speed fluid drive between the motor and fan.

Combustion air is preheated to 300° F. in a steam coil heater. Provision is made for installation of oil burners in the recovery furnace either to assist the black liquor burning or to generate steam when no liquor is available. Soot blowers on this unit are of the air puff type and are fully automatic.

The boiler house and recovery room have a common operating floor as well as a common feedwater system, blow-off tank and steam header. All three units are under the supervision of one operating engineer. The recovery unit's instruments and controls are separate from the boiler instruments and controls.

During normal operation the water loss through evaporation will not be over 20 percent. Make-up water and mill condensate returns are fed to the re-aerator which operates at 15 pounds per sq. inch. The de-aerator, which is of the spray atomizing type, together with the feed water storage tank, has a 20 minute storage capacity.

Of the two main feed pumps one is motor and one is turbine driven, the latter being used for normal operation. An auxiliary motor driven feed pump is also provided for shut-down periods.

Oil heater unit is of the dual type for continuous operation, one pump being motor driven and the other steam operated.

Electric Power

Electric power, purchased from B. C. Power Commission is transmitted to the mill at 60 K.V. from the Camp-

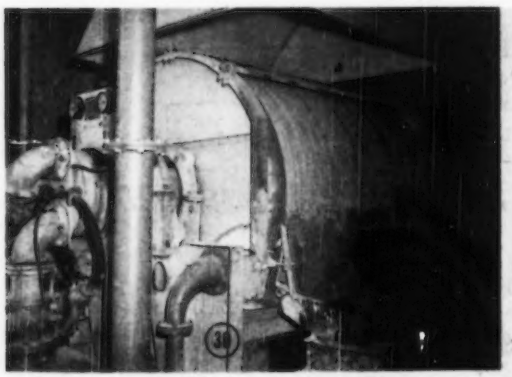


Figure 30—Oliver-United Lime Sludge Vacuum Filter. Figure 31—Traylor Lime Kiln. Figure 32—Number One Ramsey Well Pump House and Mill Supply Pipe Line. Figure 33—Vertical Pumps in Number One Well Pump House.

bell River hydroelectric development. Voltage is stepped down to 13.8 K.V. before being connected to the mill system.

Power is controlled by a 15 K.V. metal clad switchboard comprising a main breaker, metering and control compartments and four feeder breakers. All breakers are electrically operated and provision is made for the future addition of remote control.

The mill is served by three 13.8 K.V. feeders, each supplying one step-down substation. Here power is transformed to utilization voltage of 2,300 or 550 as required. Each substation is designed to accommodate up to 3—1,500 K.V.A. 3 phase transformers, each of which supplies a distinct portion of the load. This limits the interrupting capacity on the low voltage system to safe values both for motor control equipment and feeder cables and at the same time emergency interconnection of adjacent transformer loads is relatively simple. Each low voltage feeder is controlled by an appropriate air circuit breaker, groups of which are arranged in conventional dead front switchboards.

All distribution throughout the mill site at 13.8 K.V. and below is carried underground via lead covered and armoured cables. These cables are laid directly in the ground. Ducts are used under roads and buildings only. Due to the rocky nature of the terrain a continuous duct system was impractical.

A fourth 13.8 feeder circuit supplies power to the mill water supply pumping stations via a wood pole transmission line of conventional design. Step-down to utilization voltage is effected at each pumping station where transformers are mounted in the pump station roofs well above possible flood levels.

Electrical Equipment

Individual motors are provided for all drives. Windings are specially impregnated for pulp mill service protected, splash-proof and totally enclosed types are used according to their location. Synchronous motors are employed on all vacuum pumps, compressors, recovery boiler induced draft fan and on the log chipper.

With two exceptions, all motors are line start and draw-out magnetic starters grouped in cabinet type switchboards. Except in the machine room all motor starters are grouped in a central switch room provided in each building. Push button control centres controlling various sections of each plant unit are conveniently located at each operating position.

In general each operator can control all drives under his jurisdiction from his control station. A feature of the installation is the hydraulic barking and chipping plant. A two-pole 1250 H.P. induction motor of special design is employed to drive a multi-stage high pressure pump. The log chipper is driven by a direct connected 1,500 H.P. 277 R.P.M. synchronous motor. This is also of special design both electrically and mechanically due to the nature of this service. Both the above motors are started directly by means of fully magnetic starting equipment. Dynamic braking is employed on the chipper motor to reduce stopping time.

Adjustable speed D.C. drives are used on all log conveyors feeding to and from the hydraulic barker.

All motor control equipment is housed in a special switch room with push button controls grouped in special control panels at each operator's position.

All feeder breakers and cables were selected on the basis of both normal load and the system fault capacity at that particular point.

The system employed here is essentially simply, involving the minimum amount of equipment consistent with adequate capacity and reasonable reliability. Good equipment properly applied and installed has been preferred rather than extensive duplication of service facilities.

Water Supply System

One of the most unusual features of this mill is the water supply system which consists of two Ranney wells located about 5½ miles from the mill site. These two wells are about 3,000 feet apart. Thirty inch wood stave pipes from each well are joined together with a Y connection into a 40 inch wood stave pipe line which carries the water to the mill. A third well may be sunk, if it is found necessary, in order to provide the estimated 23 million gallons required when the bleaching system is completed.

The first well that was put into operation produces about 15 million gallons per day but the second well may fall slightly short of the additional 8 million gallons per day which will be required by November 1950.

The Ranney water collector consists of a reinforced concrete caisson built in sections and sunk down to the water level. Each section is 11½ feet deep, 13 feet inside diameter, 16 feet outside diameter with 18 inch walls.

The sections to be located in the water bearing strata have pre-cast ports through which 8 inch slotted pipe is forced out radially like spokes in a wheel.

Ranney wells have been built with shaft depths up to 150 feet and laterals have been extended up to 300 feet. The Nanaimo wells are 88 feet deep with laterals extending up to 160 feet.

Some of the advantages claimed for this type of well after surging and development are: unlimited sand and gravel exposure by horizontal laterals of great lengths; an unlimited area of screen openings for the water to enter; horizontal gravel beds radiating from a central shaft, each bed surrounding a perforated pipe that delivers filtered water by gravity into the shaft, and unlimited room for huge pumps that can be serviced without lifting. By this system the buried sand and gravel beds become actual, instead of potential, underground reservoirs.

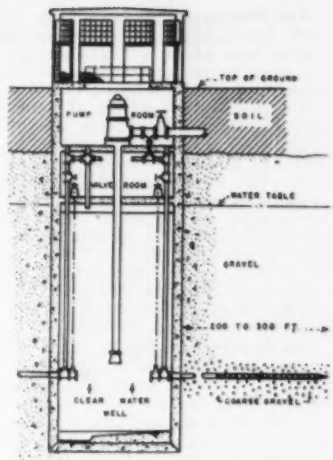


Figure 34—Verticle Cross Section of Ranney Well.

These wells may be used to draw water containing suspended solids from surface streams, through natural gravel beds, which act as filters but are much larger and more effective than commercial units.

Since the cost of construction of Ranney wells is much less than that of filter plants, a considerable amount of capital investment may be saved by substituting them for filter plants where conditions are suitable.

Ranney wells are constructed by pouring a reinforced concrete cylinder 16 feet O.D. 13 feet I.D. and 11½ feet high in portable forms on the well site. The earth on the inside of the cylinder is then clammed out, allowing the cylinder to sink by its own weight. Reinforcing steel protrudes from the top of each section, so that when the next section is poured on top it becomes firmly integrated with the first. As each section is added, more earth is clammed out to allow the structure to sink. Supervision of experienced engineers is required to maintain the proper vertical alignment of the shaft. When the sections to be located in the water bearing strata are poured, a number of 10 inch diameter ports are cast in the walls.

When the shaft has been sunk to the proper depth, a concrete plug, seven feet deep is poured in the bottom.

A ten inch flanged gate valve is bolted to each port flange. Eight foot sections of eight inch slotted pipe are then packed out through the port openings. This pipe is standard eight inch steel oil well casing, perforated by numerous lengthwise slots three inches long by ⅛ inch wide. The slot area amounts to 18 percent of the total pipe area.

The first section of lateral pipe in each line contains a cone shaped cutting head which is forced through the water bearing gravel by a double tunnel jack which exerts a pressure of 120 tons. As each section of slotted pipe is pushed out to near its full length another section is connected by means of a tapered thread joint with under cut threads capable of withstanding a force of 180 tons. These lateral pipes may be pushed out as far as 300 feet but the longest in the Nanaimo wells is 160 feet and the shortest 11 feet. The latter ran up against a large rock at that point. The average length at Nanaimo is 125 feet. Number one well has 19 laterals.

As the eight inch pipe is jacked out, a three inch solid pipe is placed inside with its open end inside the cutting point. Sand and silt is drawn from the vicinity of the cutting tip through the smaller pipe, as air is blown out through the eight inch slotted pipe. This prevents the gravel from packing around the screen pipes and removes soil and fine material so that a flow of clear water through the gravel bed may be obtained. When the lateral has been completed and silt and sand removed from the gravel bed surrounding it, the three inch pipe is removed from the inside of the screen pipe.

When the well is complete, the ten inch valves on the laterals are equipped with extension shafts control from an operating platform at the top of the shaft where the pump house is also located.

Number one well at Nanaimo is equipped with three vertical shaft pumps each equipped with a U. S. motor operating 1200 R.P.M.

An operating advantage of this type of well is that the quantity and quality of water coming from each screen pipe can be measured and tested. This simplifies the establishment of proper rates of filtration and pumping. By the backwashing or blowing of each pipe, which is easily done as a matter of routine, the effectiveness of the natural filter is maintained.

The water being supplied is at all times separated from the equipment and personnel by watertight walls, so that the chances of accidental contamination are less than in a filter plant. The bacterial content of water produced by Ranney units compares favorably with that of wells or filters.

These installations provide convenient facilities for inspection, maintenance, reconditioning and replacement of all the vital parts and even allow extension of the original capacity by putting out new screen pipes without interruption of services for any considerable time. Each screen pipe can be regulated or shut-down separately without interfering with the production of the other collecting elements.

Conclusion

The executives with imagination and initiative, who planned this project; the engineers with technical know-how, who designed and constructed it; the machinery builders who have constantly improved their products; and the management and operating staffs with their resourcefulness and ability to "make it work," all deserve the highest praise and respect from the Pulp and Paper Industry for their accomplishments on this job and for not being afraid to try something new.

Key personnel of the company includes, H. R. MacMillan, Chairman of the Board; W. J. Van Dusen, Vice-chairman; B. H. Hoffmeister, President; Clifford Crispin, Mill Manager; L. G. Harris, Supt.; R. E. Simkins, Plant Engineer; D. H. Baker, Technical Supervisor; Eugene Machell, Chief Chemist; D. B. Rankin, Office Manager and Donald Gray, Personnel and Safety Supervisor.

The eyes of the Pulp and Paper Industry will be focused on this mill for many months to come, so that its new features may be properly evaluated.

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List of Major Equipment & Suppliers

Machine Room

Description	Vendor
S. F. Flakt Dryer	Paper Machinery Ltd., Montreal, Que.
Fourdrinier and Press Section	John Inglis Co., Ltd., Toronto, Ont.
Cutter and Layboy	Lamb-Grays Harbour Co., Inc., Hoquiam, Wash.
Harland Sectional Drive	Bepco Canada, Ltd., Vancouver
Baling Press	Baldwin Locomotive Works, Ltd., Toronto
Scale and Automatic Sheet Weighing	Toledo Scale Co. of Canada, Ltd., Vancouver, B.C.
Travelling Crane	Provincial Engineering Co., Ltd., c/o Engineering & Machinery, Vancouver
Broke Beater	Waterous Ltd., Brantford, Ont.
Vacuum and Stock Pumps	Bingham Pump Co., Ltd., Vancouver
Motors and Controls	Canadian General Electric Co., Ltd., Vancouver
Fourdrinier Wire	Johnson Wire Works Ltd., Montreal
Blending Tank Agitation	Bingham Pump Co., Ltd., Vancouver

Screen & Digester Building

Stainless Lined Digesters	John Inglis Co., Ltd., Toronto
Digested Blow Valves	Yarnall-Waring Co. c/o Drexel Co., Vancouver
Digester Circulating System	Esco Ltd., Vancouver
Digester & Piping Insulation	Fiberglass Canada, Ltd. c/o Drexel Co., Vancouver
Instrumentation	Foxboro Canada, Ltd., c/o Peacock Bros., Vancouver
Blow Tank	Dominion Bridge Co., Ltd., Vancouver
Brown Stock Washers	Sherbrooke Machineries, Ltd., Sherbrooke, Que.
Deckers	Sherbrooke Machineries, Ltd., Sherbrooke, Que.
Flat Screens	Waterous, Ltd., Brantford, Ont.
Screen Plates	Union Screen Plate Co., Ltd., Lennoxville, Que.
Washer and Decker Wires	Johnson Wire Works Ltd., Montreal
Motors and Controls	Canadian General Electric Co., Ltd., Vancouver
Tanks	Dominion Bridge Co., Ltd., Vancouver
Pumps	Bingham Pump Co. Ltd., Vancouver
Vat Agitators	Alexander Fleck Ltd., c/o Fleck Bros., Ltd., Vancouver

Recovery, Evaporator & Boilerhouse

Recovery Boiler	Combustion Engineering Co., Ltd., Montreal
Hog Fuel Boilers	Combustion Engineering Co., Ltd., Montreal
Dutch Ovens	Bigelow-Liptak Co., c/o Drexel Co., Vancouver
Refractories	A. P. Green Co. c/o Drexel Co., Vancouver
Insulation	Fiberglas Canada, Ltd., c/o Drexel Co., Vancouver
F. D. and I. D. Fans	Fiberglass Canada, Ltd. c/o A. R. Williams Machinery Western Ltd., Vancouver
Combustion Control	Hayes Corporation c/o David A. Darling, Vancouver
Feedwater Control	Bailey Meter Co., Montreal
Fuel Oil Heating and Pumping	The Engineer Company, New York
Concrete Stack	Rust Engineering Co., c/o Wm. N. Kelly, Vancouver
Turbines	Worthington Pump Machinery Corp., John Inglis Co., Vancouver
Feed Pumps	Bingham Pump Co., Ltd., Vancouver
Sextuple Effect Evaporator	John Inglis Co., Ltd., Vancouver
Vertical Surface Condenser	John Inglis Co., Ltd., Vancouver
Deaerator	Permutitt Co. of Canada, c/o Bumstead-Woolford, Seattle
Air Compressors	Canadian Ingersoll-Rand Co., Ltd., Vancouver
Electric Precipitation	Precipitation Co. of Canada, Ltd., Montreal
Motors and Controls	Canadian General Electric Co., Ltd., Vancouver

Recausticizing and Filter Plant

Recausticizing System	The Dorr Co., Inc., Vancouver
Lime Sludge Kiln	Canadian Traylor Engineering Corp., c/o A. B. Wing Co., Vancouver
Refractories	General Refractories Co., c/o Drexel Co., Vancouver
Lime Mud Filter	Oliver United Filter Co., Oakland, Cal.
Instrumentation	Foxboro Canada, Ltd., c/o Peacock Bros., Vancouver

Chip Storage Bins

Rotary Plate Chip Feeders	Link-Belt Co., Ltd., Vancouver
Weightometer	Merrick Scale Manufacturing Co., Seattle
Conveyors	Link-Belt Co., Ltd., Vancouver Chain Belt Co., Ltd., c/o G. W. Brockley, Vancouver
Conveyor Belts	Goodyear Tire & Rubber Co., Ltd., Vancouver Dunlop Rubber Co., Ltd., Vancouver

Hog Fuel Storage Bldg.

Hog Fuel Feeders, Equipment	Ross & Howard Iron Works, Ltd., Vancouver
Hog Fuel Feeders, Construction	Dominion Bridge Co., Ltd., Vancouver
Hog Fuel Feeders, Gear Reducers	Dominion Engineering Works, Ltd., Vancouver

Millwater Supply

Ranney Well Installations	Signal Oil & Gas Co., Los Angeles, Cal.
Deep Well Pumps	Byron-Jackson Co., c/o Railway & Power, Vancouver

Bleach Washers	Sherbrooke Machineries, Ltd., Sherbrooke, Que. E. Long Co., Ltd., Orillia, Ontario	Ceramics	Canadian Stebbins Engineering Co., Ltd., Seattle, Wash.
Bleach Deckers	Sherbrooke Machineries, Ltd., Sherbrooke, Que.	Chlorine Gas Unloading System	Hooker Electrochemical Co., Tacoma, Wash.
Bleach Flat Screens	Waterous, Ltd., Brantford, Ont.	Bleach Towers and Tanks	Dominion Bridge Co., Ltd., Vancouver
Bleach Mechanical Equipment	Paper Machinery, Ltd., Montreal, Que.	Pumps	Bingham Pump Co., Ltd., Vancouver
Sulphur Burner & SO_2 Gas System	A. H. Lundberg, Esq., Seattle, Wash.		Canadian Ingersoll-Rand Co., Ltd., Vancouver
Heat Exchanger (Rosenblad)	A. H. Lundberg, Esq., Seattle, Wash.		

The Use of Precoat Filters as Savealls At Scott Paper Co., Chester, Pa.

E. P. McGINN[1]

Because of the constantly increasing emphasis now being placed on stream improvement, with consequent demands for reducing BOD and suspended solids of pulp and paper mill effluents, the recent installation of four Waco filters for treatment of the mill effluent at Scott Paper Co., at Chester, Pa. is extremely important.

The present installation handles 50 per cent of the mill effluent but does a remarkable job in reducing the solids in the effluent from an average of about 2 lbs. down to 0.1 lb. per 1000 gallons. The recovery efficiency of the suspended solids is 95 per cent. Each of the four units recovers about 1000 lb. of stock per day.

[1] Industrial Editor, Paper Trade Journal.

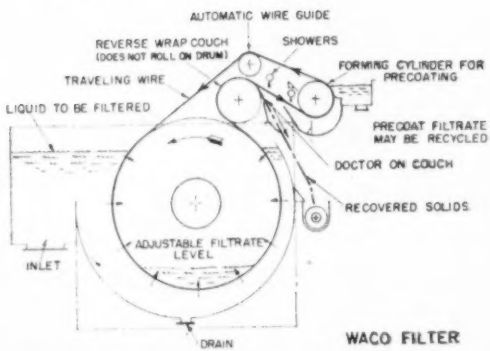

Figure 1

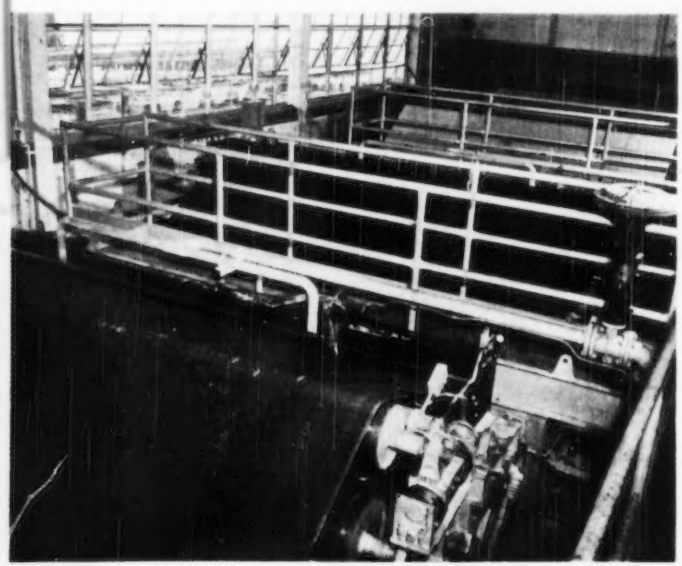

Figure 2—Top View of Multiple Unit Waco Filter Installation at Scott Paper Co., Chester, Pa.

The Waco filter uses the same principle as that used in laboratory filtration, that is, the use of a filter paper or fibrous mat as the filtering medium.

The Waco or precoat filter accomplishes this by continuously forming a mat on the wire screen before it enters the vat to come in contact with the white water to be filtered. This is shown diagrammatically in *Figure 1*.

The machine consists of a main cylinder in a vat with a smaller precoat cylinder slightly above and to the rear. Over both of these cylinders a 40 x 45 mesh fourdrinier wire is suspended. The wire also goes around a guide roll and a reverse-wrap couch roll as shown in *Figure 1*. After the wire is strung in place it is made endless by closing the seam.

The main cylinder is somewhat similar to a board forming cylinder without the backing or covering wire. This cylinder is 6½ feet diameter with a 14 foot face. These units are made in sizes of 7 or 14 foot cylinder face, all having a diameter of 6½ feet. The precoat cylinder is 16" diameter.

A 5 HP DC motor drives the cylinder through a reduction gear at any speed from 10 to 40 feet per minute.

The stock used in forming the mat

is usually paper machine furnish before beating. This stock should be free enough to allow fairly rapid flow of water through the mat but the voids must be small enough to trap the small particles of fiber and filler in the white water. Mixtures of groundwood and long fibered chemical pulp such as used on the paper machines at Chester, give very good results as furnish for the precoat mat. Since the stock used in forming the mat together with the recovered white water stock, is returned to the system, the amount of the mat stock used is of no great importance. Actually the ratio between mat stock and recovered stock is about 4 to 1.

In operation, a mat of stock is formed on the wire as it passes over the precoat cylinder. The wire with its coating of stock goes over the guide roll and then passes to the main cylinder which it wraps before entering the vat containing the white water. The solids in the white water are filtered out as it flows through the mat to the inside of the cylinder.

The wire, with its mat of precoat stock and recovered fiber, continues on around the main cylinder and up, out of the vat, to the couch roll where the mat is pressed between the couch and the wire. As the wire leaves the couch roll, the stock separates from it and adheres to the roll from where it is doctored off into a trough, diluted and returned to the pulp preparation system. The wire continues on through a wire cleaning shower and thence to the precoat cylinder.

Filtrate from the precoat cylinder is used to dilute the incoming mat stock and is thus recirculated.

The units at Scott have complete automatic control.

Level in the vat is maintained by a level controller operating a butterfly valve in the pipe line to the vat.

As the vat level drops or the solids content decreases the butterfly valve starts to close, as the vat level rises the process is reversed. The speed of the filters is automatically adjusted to the rate of flow of the incoming white water. The mat stock system is also connected with this same control system to insure a constant unit weight of mat stock for any speed of the traveling wire.

Calcasieu Paper Company

G. H. FERGUSON[1] and E. P. McGINN[2]

Back in 1917 the Industrial Lumber Co. located in Elizabeth, La., had one of the largest sawmill operations in this part of the state. Its vast requirements of long leaf pine logs were obtained from its holdings of about 100,000 acres. During the period of 1923 to 1925 a pulp and paper mill, then known as the Calcasieu Sulphate Paper Co. was established to utilize the waste lumber and small timber not suitable for saw logs. The mill production of 40 tons was later increased to an average of 55 tons of kraft bag and wrapping paper.

The mill buildings were largely of wooden construction with exception of a reinforced concrete beater room building added in 1927. Equipment consisted of a single 108" Beloit Fourdrinier machine, trim, 96", three 2,000 lb. beaters, four jordans, Trimbey screens and saveall, two tumbling digesters and seven diffusers, two old style rotary soda recovery units, triple effect evaporator and a batch causticizing system in which lime sludge was not reburned.

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C. G. McGHEE
President

T. R. McGHEE
Asst. to President

In 1946 the controlling stock of the Calcasieu Paper Co. and the power plant, were purchased by Jacksonville Paper Co. Immediately, consideration was given to expansion and modernization in order that the mill could maintain a competitive position with other Southern mills.

The services of Alvin H. Johnson & Co., Paper Mill Engineers of New York City, were secured for the complete layout and design, and specifications of equipment for the expansion program. After a study of the existing plant, plans were laid out to fit the company's future requirements.

The fall of 1948 saw the beginning of construction with the new paper storage building and shipping facilities being the first construction since the old units had to be removed to make room for the new machine room. Excavation and concrete work for the machine room and other mill departments were under way in December. Edmunston Construction Company, of Rayne, La., was the contractor. Due to the exceptional rainy spell which continued through until the following March, the construction schedule could not be maintained, thus delaying the eventual completion date by about two months.

H. K. Ferguson & Co., Cleveland, Ohio, Contractors, were later secured for portions of the construction work and the complete installation of all equipment, piping, valves, etc., as well as all of the electrical work necessary for completion of the mill. On May 6th, 1950, the new pulp mill and the Pusey & Jones paper machine began operating.

AL JOHNSON
Consulting Engineer

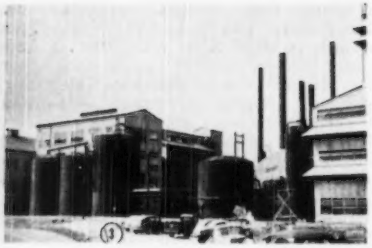


Figure 1—G. H. Ferguson, Project Engineer at left and D. W. Davidson, Field Engineer for A. H. Johnson & Co. Figure 2—Exterior View of Plant. New Finishing and Roll Storage Building in Foreground. Pulp Mill and Recovery Plant at Right Rear. Figure 3—Exterior View Pulp Washer Seal Tanks and Foam Breaker at Left. Evaporators and Recovery Building at Right.

The new owners also erected at the mill site a modern bag plant containing 35 bag converting machines with roll printers and rewinding machines, providing a daily production of three and a half million notion, millinery, grocery, mail, garment and other types of bags and sacks. This integrated operation was planned to supply the 17 branches of the Jacksonville Paper Co. in the southern states, as well as the general customers of the mill.

The company has its general offices in Jacksonville, Fla. Clifford G. McGehee is President and Chairman of the Board. The officers include M. R. McGehee, Secretary-Treasurer; C. C. McGehee, Vice-President; Tillman Cavert, Jr., Vice-President, and T. R. McGehee, Assistant to the President.

At the mill offices in Elizabeth, La., are—Edward K. Ahrens, Vice-President and General Manager; J. E. Bond, Assistant Treasurer; W. L. Vignes, Production Manager; Lee Howard, Jr., Chief Engineer; B. A. McMahon, Forester; W. M. Cunningham, Purchasing Agent; and A. A. Cavanaugh, Personnel Manager; G. W. Mullins, Sr., is Paper Mill Superintendent, and C. J. Hanchey, Assistant Paper Mill Superintendent; Dennis Sirman, Chief Electrician; L. C. Gill, Sr., Maintenance Superintendent; L. J. East, Steam Superintendent; and J. D. Collins, Finishing Room Superintendent.

Wood Handling

Most of the pulpwood is brought in on railroad cars by the Santa Fe railroad and unloaded from the mill owned woodyard sidings either to the storage piles or to the chain conveyors which take it to the barking drums.

The old barking drum, which is now used as a stand-by or at times when extra capacity is desired, is 10 feet diameter by 40 feet long. The new drum is 12 feet diameter by 45 feet long and is driven by a 150 H.P., 720 R.P.M. slip ring motor. This new drum was built by Fibre Making Process Company and has sufficient capacity to handle normal mill requirements.

Bark from the drum is carried on a belt conveyor to the Babcock & Wilcox Co.'s bark and refuse boiler which supplies mill process steam at 175 lb. p.s.i.

Barked wood is carried by Link-belt conveyors to the 88" ten knife chipper, built by D. J. Murray Co. The chipper spout is 18¾ inches I.D. and can safely take wood up to 16 inches diameter. The disc is driven by a 350 H.P., 720 R.P.M. wound rotor motor from a 2300 volt 60 cycle 3 phase power supply. The chipper disc speed is reduced to 300 R.P.M. by a multiple V-belt drive.

The chipper has a capacity of 30 cords per hour with wood averaging seven inches diameter. The chips are carried on a belt conveyor to two Tyler "Ty-Rock" chip screens, each five feet wide by 12 feet long and driven by 7½ H.P. motors through V-belt drives. Each unit has two screening surfaces, the top one collecting oversize material and the lower surface retaining the accepted chips. Sawdust and fine material falls through to a belt conveyor which takes them, as well as the oversize material, to the bark burning boiler.

Accepted chips are carried on a belt conveyor up to the chip bins above the digesters.

Digester Building and Equipment

The original digester building is of wooden frame construction, housing two tumbling digesters 10" diameter by 28' 6" long. These were supplied by Babcock & Wilcox Company about 1928. They operated in conjunction with seven diffuser tanks into which the cooked pulp was blown and washed preparatory to screening. The site of the new extension was occupied by seven 400 K.V.A. G.E. Company's 2300-230/460 transformers and power wiring which had to be relocated before construction could start.

The new digester foundations had to be constructed in steps to avoid interfering with operation of the existing chip conveyor, structure, and building foundation; and structural steel had to be in place for operation of the new chip bucket elevator and distribution conveyors supplied by Link Belt Co. before dismantling of the old equipment. All this work was carried on in progressive steps which eventually resulted in only an eight hour shut-down of chip production for the existing digesters.

The new building, which is 92 feet long by 20 feet wide by 74 feet high, is of modern design having structural steel framing with steel plate chip bins, concrete floor construction and corrugated asbestos roofing and siding. It contains four new ten feet diameter by 28 feet 6 inches long tumbling digesters having a design operating steam pressure of 150 P.S.I. with drives, supplied by the Blaw-Knox Company of Pittsburgh. Each is driven by 15 H.P. G.E. T.E.F.C. motor, geared so that a revolution is made every seven minutes and provision is made that direction of rotation can be reversed to equalize internal erosion of the fire box steel shell.

On the digester operating floor are four 12 feet diameter by 8 feet high, white liquor measuring tanks, together with complete control instruments furnished by The Foxboro Co.. Each digester cook of four tons requires approximately one hour, 45 minutes at 150 P.S.I., the complete cycle being 2 hours 35 minutes. The stock is blown into a blow tank having a capacity of approximately 8 cooks, equipped with an IMPCO propeller agitator from which it is pumped to the pulp washing department. All liquor pumps and stock transfer pumps are of "Worthite" construction supplied by Worthington Pump Corp. Blow piping is 8 inches diameter, Schedule 80, supplied by T & R Construction Co., Houston, Texas. The 8 inch diameter blow valves are supplied by Electric Steel Foundry Company, with Homestead blow line transfer valves furnished by Eastern Steam Specialty Co. Fisher-Governor Company supplied all steam pressure reducing valves. Motor starting equipment is contained in Cabinetrol centers supplied by G. E. Company.

Pulp Washing & Stock Preparation

To house the new pulp washing and screening system, a reinforced concrete and steel building was constructed. This building is 80 feet long, 34 feet wide and 66 feet high. The building has five operating levels, two of which are intermediate or mezzanine floors. There are two built-in stock

chests of reinforced concrete, each being 36 feet long by 16 feet wide by 16 feet high. Each of these chests has a capacity of 10 tons of stock at 4 percent consistency. One chest is used for storage of washed stock to the screens, the other is used for screened stock to the primary jordans.

The two-stage IMPCO vacuum washer is located on the upper main level, preceded by a built-in IMPCO vibratory knotter containing two baskets equipped with removable plates.

Each basket is motivated by a 5 H.P. 1800 R.P.M. totally enclosed, fan cooled motor. Knots are removed in a fabricated steel screw conveyor driven by a 3 H.P. totally enclosed motor. Accepted stock flows into the first washer vat.

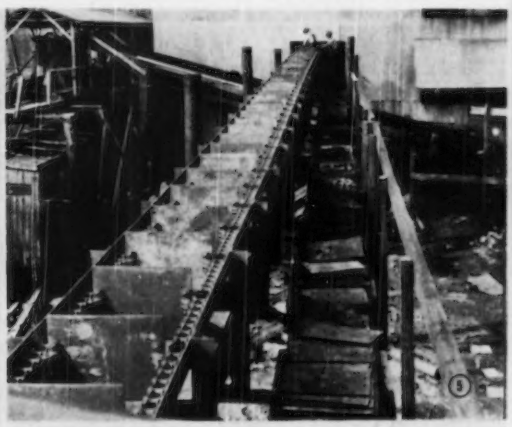
The washer cylinders are eight feet diameter by twelve feet long and each is driven by a 10 H.P. D.C. speed variator TEFC motor. An M.G. set with 440 3-phase squirrel cage drive motor and a 250 volt D.C. generator provides D.C. current for the cylinder drive motors. Speed range of the cylinders is 1 – 4 RPM.

The washing system has a capacity of 175 tons of pulp per day with 40 lbs. per ton maximum soda loss. At a rate of 200 tons per day the maximum soda loss will be slightly more than 40 lbs. per ton. A built-in repulper follows each stage of washing. Foxboro instruments and controls are used on the washer system.

Effluent from the washers goes to the two washer seal tanks and foam tank from where it is pumped to the weak black liquor storage tank.

Pulp from the washing system drops down to the washed stock chest. The stock is then pumped to the Trimbey rotary screens and a Trimbey consistency regulator adjusts consistency. There are four of these, one tailing screen and three primary screens. A sixteen plate flat screen is used as a secondary and final tailing screen. Rejects from the rotary tailing screen are sent through this flat screen.

Figure 7—Detail of the Niagara Shaking Chip Screens with the Conveyors underneath. One is for Chips, one is Rejects to the Crusher.



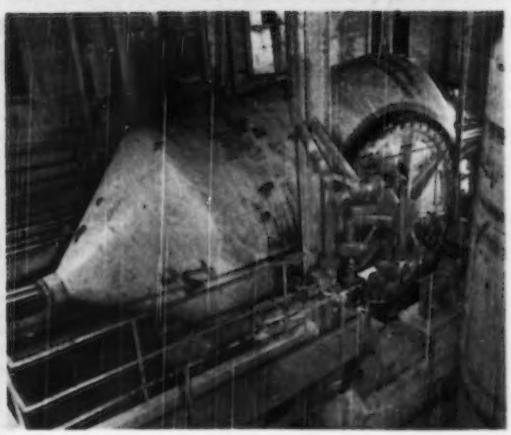
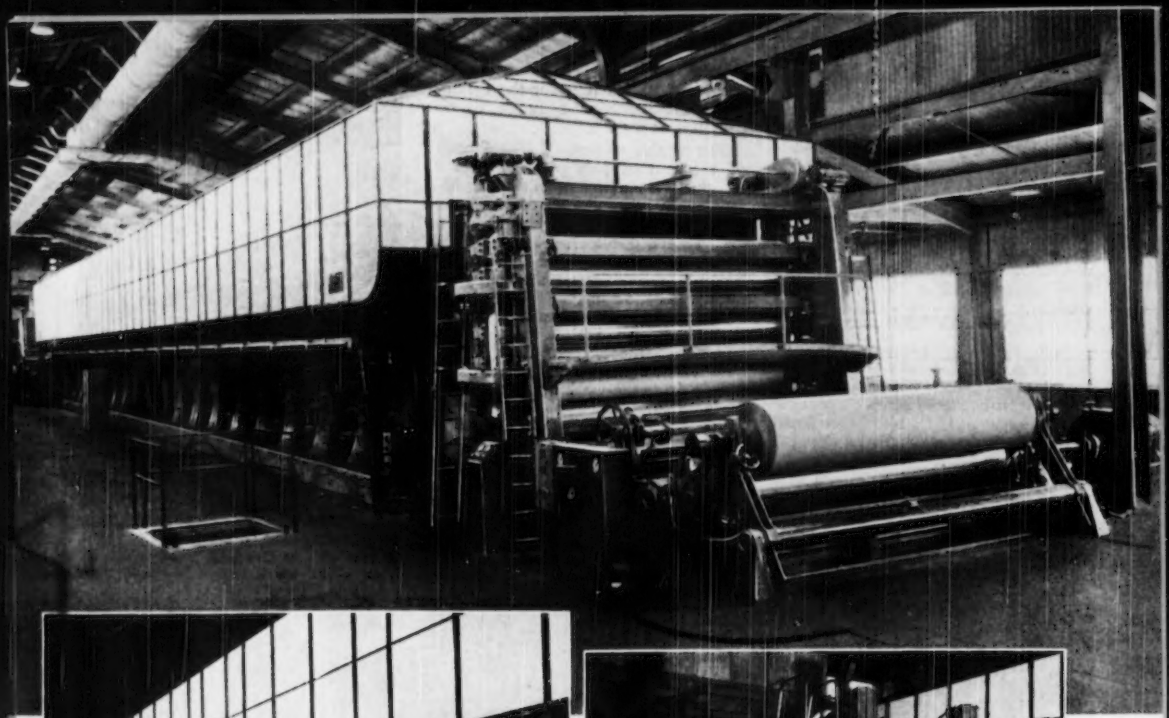
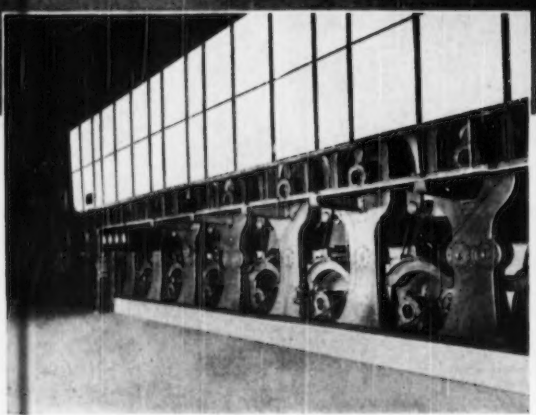
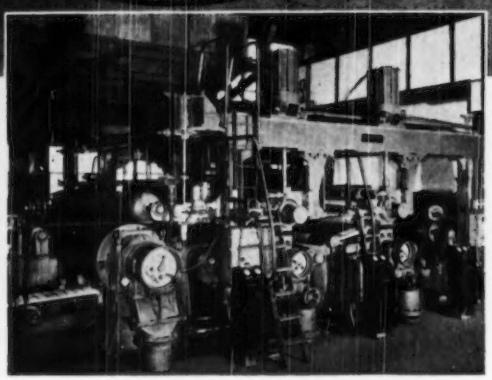


Figure 4—Close Up of the Discharge End of the Barking Drum and the Conveyors to the Chipper. Figure 5—Drag Chain Conveyor whose Flights Receive the Bark from the Belt Conveyor and Deposit Same into the Bark Burning Boiler Hoppers. Figure 6—View of the Chipper and Drive after Building has been Completed and the Chip Conveyors practically complete. Figure 8—Digester in a Horizontal Position with its Drive Wheel and the Control Valves for Steam to the Adjacent Digesters.







FEATURES OF 160" PUSEYJONES FOURDRINIER MACHINE AT CALCASIEU

Improved type Flow Spreader combined with 10 ft. high adjustable stainless clad slice.

Fourdrinier Part suitable for a wire 100 ft. long and 160" wide, equipped with 36" suction couch, lump breaker roll with improved raising and lowering mechanism, 8–7" wide suction boxes, dandy roll, "Rapi-drape" wire changing device, and adjustable wire pitch arrangement.

Press Part of Simplex close-coupled design with 28" rubber covered first and second main presses and Vickery felt conditioners.

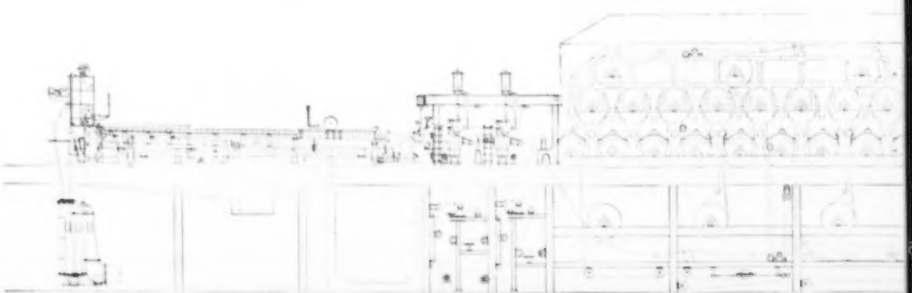
Dry Part in two main sections having one upper and lower felt on each section; first section comprises 20–60" paper and 4–60" felt dryers, second section comprises 20–60" paper and 2–60" felt dryers; Bowser lubricating system for main dryer bearings and gearing; rope carrier device for threading the sheet through the dryer sections; improved type enclosed gearing; latest type steam joints with dual revolving siphons.

Calender Stack comprising 8 rolls with independent Bowser oiling system for all roll bearings; also pneumatic nip loading system.

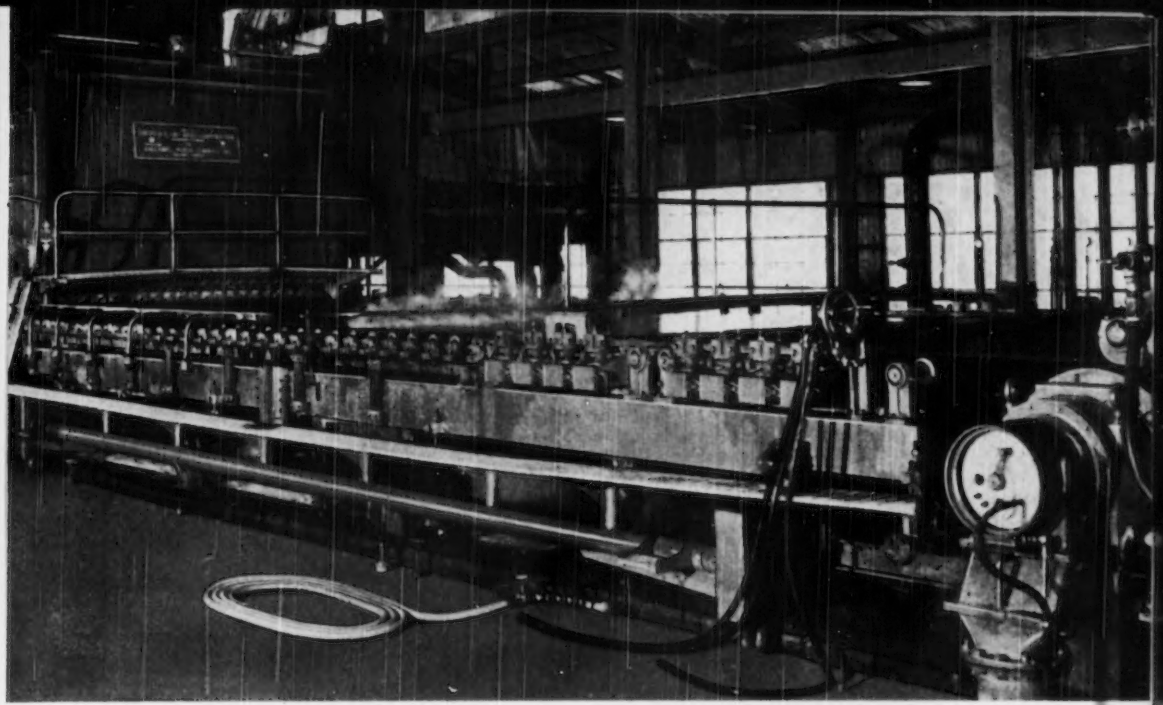
Pope type Uniform Speed Reel of improved design, with pneumatic adjustable loading mechanism.

Unwinding stands with water-cooled friction brake.

Puseyjones Winder with hydraulic-operated roll unloading mechanism.



Line drawing of new machine. Designed and constructed for maximum operating speed of 1500 feet per minute of Kraft bag and wrapping papers with G.E. sectional motor drive.



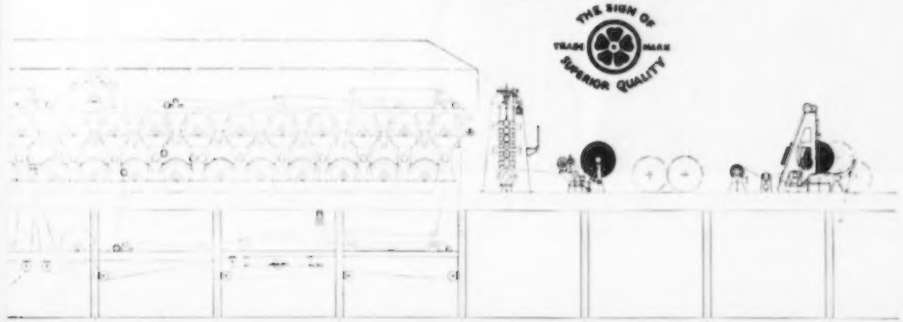
MORE PRODUCTION FOR CALCASIEU

Shown here is the new 160-inch Puseyjones Fourdrinier Machine in operation in the new, modern plant addition of the Calcasieu Paper Company Plant, Elizabeth, La., the latest unit installed in the South for the production of Kraft bag and wrapping paper. The latest features in machine design from Wet End to Winder have been incorporated in this new machine for more efficient, higher tonnage Kraft production.

Whether your plans call for the installation of completely new machines, or replacement of individual equipment, call in Puseyjones, builders of high-speed, quality machines.

THE PUSEY AND JONES CORPORATION
Established 1848. Builders of Paper-Making Machinery
Wilmington 99, Delaware, U.S.A.

THE SIGN OF TRADE MARK SUPERIOR QUALITY



All rolls and rotating parts in the new Puseyjones Fourdrinier Machine at Calcasieu, with the exception of the lower calender roll, are equipped throughout with anti-friction bearings.

Accepted stock from the screens goes to an 8 ft. diameter by 10 ft. face Oliver vacuum thickener. The thickened stock drops into the screened stock chest.

The thickened stock, 3½ percent, 4 percent consistency, is then pumped to the two primary jordans, each good for 150 tons. Stock then drops to machine chest having a storage capacity of approximately 10 tons at 4 percent consistency. The stock passes through a Trimbey consistency regulator and is pumped to the secondary jordans, which discharge to the constant level headbox supplying the machine fan pump.

Four Emerson number four jordans are used to prepare the stock for the new paper machine. Each jordan is directly connected to a 400 H.P. G.E. synchronous motor rotating at 400 R.P.M. A 30 H.P. motor generator set provides field excitation current for the jordan motors. Provision is made for future installation of two more jordans.

From the primary or brushing jordans the stock flows to the machine chest. Stock from the broke beater and Oliver Saveall is also added to the machine chest.

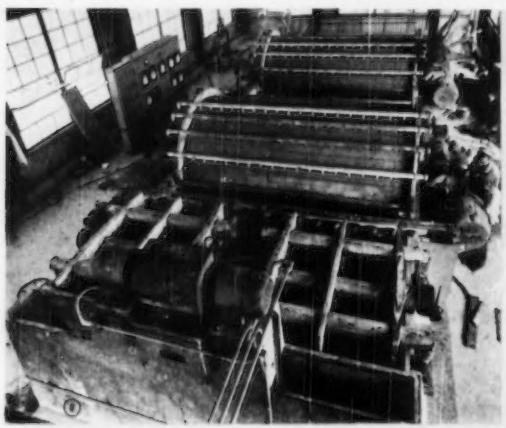
This pump is an Allis-Chalmers 20" by 18" double suction pump driven by a 100 H.P. motor through a variable speed V-belt drive. The Allis-Chalmers is 3 phase 60 cycle 440 volts, rotating at 1200 R.P.M. The pump speed ranges from 465 R.P.M. pumping 7,000 G.P.M. to 580 R.P.M. pumping 12,000 G.P.M.

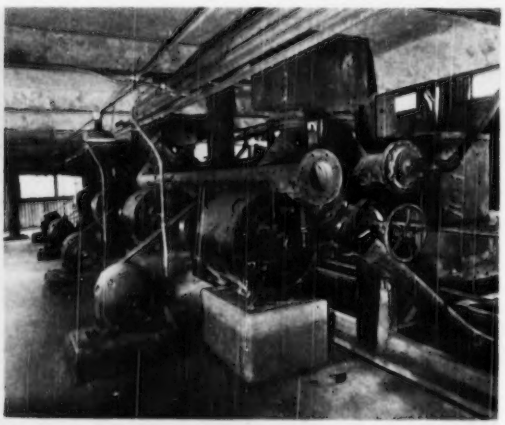
Machine Room

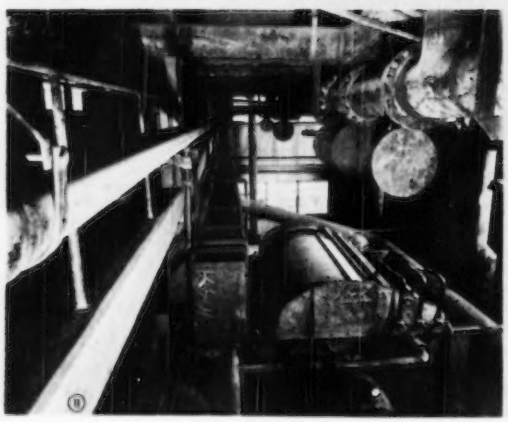
The new machine room is adjacent to and south of the old machine room building and bounded by the right-of-way of the Santa Fe Railroad on the opposite side. Careful consideration had to be given to the layout and design to confine the building within the available space and prevent settling of the existing building and railroad tracks during excavation.

The existing railroad for shipping paper, and the original underground fire protection system had to be relocated and established before construction started.

The building is 324 feet long by 58 feet wide with a finishing room extension 72 feet long adjoining the winder end of the building. The machine room proper has a 14 ft. 6 in. high basement, since the operating floors of both the old and new machines were established on the same elevation. The building is of latest modern design of concrete and structural steel construction. To depart from the conventional roof truss design, the rigid structural steel frame and arch design was used. This design was selected for the economy of steel and for better appearance and lighting conditions. Roofing and siding is of corrugated asbestos which was installed on all the new buildings. Taylor-Seidenbach of New Orleans furnished and installed this material. Consolidated Western Steel Co. of Orange, Texas, fabricated and erected all structural steel for machine room and other buildings. Truscon Steel Products supplied and installed all steel window sash.







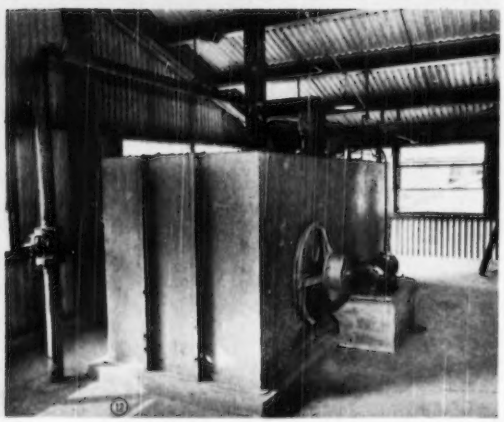
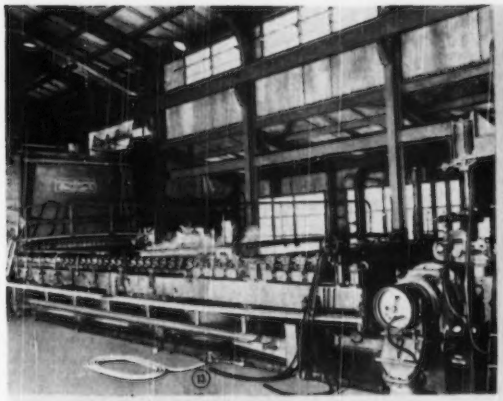
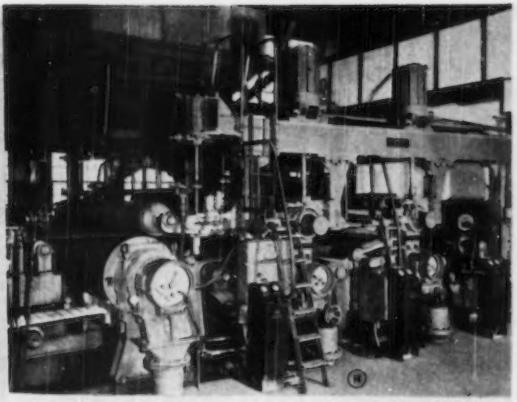


Figure 9—Washers and Pre-Knotter with their Controls in the Wash Screen Building. Figure 10—Battery of Trimbey Screens in the Stock Preparation Department. Figure 11—View Looking Down on the Oliver Decker in the Screen and Wash Building and showing the Piping and the Feeder Trough from the Trimbey Screens. Figure 12—The stock Meter and Regulator in the Stock Preparation Building.





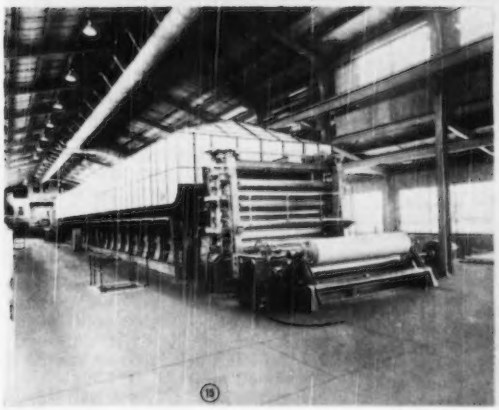


Figure 13—Fourdrinier Part of New Pusey & Jones 146" Paper Machine. Figure 14—Press Section of New Paper Machine. Figure 15—View of New Pusey & Jones Fourdrinier Machine and Machine Room, Showing Rigid Structural Steel Frame and Arch Roof of Building. Figure 16—General View from the Southeast Looking Toward the Causticizing Area with the Lime Storage Bin in the Foreground and the Recovery Boiler Building in the Background.

Paper Machines

The new Pusey & Jones Fourdrinier paper machine will produce a sheet of paper to trim 146" at the rate of 1500 feet per minute. The basis weight of the paper produced varies from 25 pounds to 95 pounds, with the bulk of the production going into standard bag, wrapping and butchers papers. The new machine is equipped with improved type Flow Spreader combined with 10 ft. high adjustable stainless clad slice.

The Fourdrinier Part contains a wire 100 ft. long and 160 inches wide, equipped with 36 inch suction couch, lump breaker roll with improved raising and lowering mechanism, eight 7-inch wide suction boxes, dandy roll, "Rapi-drape" wire changing device, and adjustable wire pitch arrangement.

The Press Part is Simplex close coupled design with 28" rubber covered first and second main presses and Bird Vickery felt conditioners.

Dryer Part is in two main sections having one upper and lower felt on each section. The first section comprises twenty 60 inch paper and four 60 inch felt dryers. The second section includes twenty 60 inch paper and two 60 inch felt dryers. A rope carrier device carries the sheet through the dryer sections. Dryer rolls are equipped with latest type steam joints having dual revolving siphons. A Bowser lubrication system filters and cools the oil used in the dryer bearings and enclosed dryer gearing.

The Calender Stack consists of eight rolls with independent Bowser oiling system for all bearings; also pneumatic nip loading system.

The paper is wound on a Pope type Uniform Speed Reel of improved design, with pneumatic adjustable loading mechanism. The unwinding stand is equipped with water-cooled friction brake and the Pusey & Jones Winder has a hydraulically-operated roll unloading mechanism.

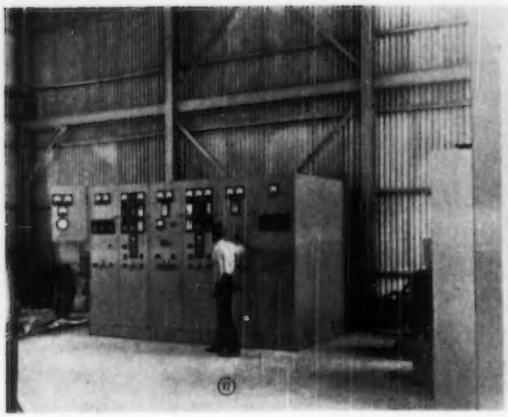
All rolls and rotating parts in the new Pusey & Jones Fourdrinier Machine at Calcasieu, with the exception of the lower calender roll, are equipped with anti-friction bearings.

The paper machine is driven by a General Electric, multiple generator amplidyne controlled, sectional drive, whose prime mover is an 800 H.P. G.E. steam turbine which receives steam at 175 P.S.I. and exhausts at max. 50 P.S.I. The exhaust steam is used for the paper machine dryers. The separate generators for each section are all on a single shaft directly connected to the steam turbine.

Ventilating System

J. O. Ross Engineering Corp. provided air systems consisting of the following parts, for the new 158" Kraft machine:

1—Hood and Exhaust System
2—Heating and Ventilating System
3—Basement Ventilation System
4—Two Bottom Felt Supply Systems
5—Calender Cooling Systems
6—Paper Machine Dry Ventilation Duct Work.



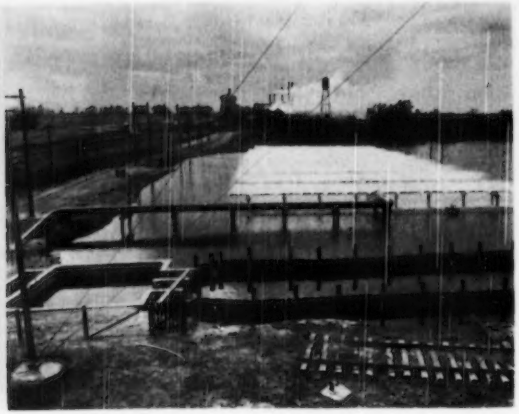


Figure 17—Detail of the 4160 Volt Switch Gear in the Turbine Room. Figure 18—Cooling Sprays for Steam Turbine Condensers at Mill Power Plant.

The hood was built of Ross standard panels, consisting of angle iron frames, to which is attached special asbestos board sheets, by means of countersunk brass machine bolts. Each panel was fabricated in our shop, so that it was merely necessary to bolt each panel to the next.

There were five (5) exhaust fans, 5 feet in diameter, built of heavy cast aluminum with three blades, designed throughout with conditions both hot and humid in mind. V-belt drives operated outside of the path of the vapors by means of extended shaft from the fans.

The fans are located on a mezzanine, and the exhaust outlets extend through the roof to the atmosphere.

Due to the rigid arched truss construction, the heating and ventilating system consisted of one main header at the peak of the hipped roof, with outlets directing the air into the pockets formed by the vents.

A large, centrifugal type Silentvane fan, and a bank of extended surface heaters provides the air at the right temperature and pressure of the roof area.

A rather elaborate duct system distributes air to the operating areas in the basement. This system has a fan and heater that is the same size and type as that used on the roof Heating and Ventilating System.

There are two Felt Supply Systems furnishing air to the bottom felt of the machine. The apparatus is located on the mezzanine on the back side of the machine, and consists of Silentvane type fans and extended surface heaters.

A Planovane fan supplies the air for the calender cooling. Adjustable outlets are arranged to direct the air at the calender so as to concentrate the air on the heated portions of the roll.

Soldered duct work conveys the air from the supply unit to the machine drive motors for cooling.

A new type of electronic paper machine regulator has been installed on the new paper machine.

The regulator provides for smoother performance of functions such as starting, acceleration, and reversing, and steady state running. Faster response and corrective action is provided to overcome effects of sudden load changes or power system disturbances. The generators supplying power to the individual section motors are driven by a steam turbine the exhaust from which supplied process steam for the mill.

The paper machine is 160" wide, making 25 to 100 lb. kraft, bag, and wrapping paper. The drive consists of seven sections operating over a speed range of 300 to 1500 FPM.

Recovery System

Liquor from the black liquor storage tanks is pumped to the Conkey, five-body quintuple effect evaporator built by General American Trans. Co., This is a long tube film type evaporator containing 18,500 sq. ft. of net effective heating surface equally distributed among the five bodies.

The shell was made in three sections which were welded into a single unit when fabricated. This type of evaporator has an integral skirt type support, making it completely self-supporting, requiring no outside framework or building supports.

The unit has capacity to handle liquor for production of 175 tons of pulp per day. It receives 146,000 lbs. per hour of black liquor at 15 percent solids, 185°F. and delivers 44,000 lbs. per hour of heavy liquor at 50 percent solids, equivalent to evaporation of 102,000 lbs. of water per hour.

The evaporator uses 25,800 lbs./hr. of 35 PSIG steam in the first effect and 1300 GPM of cooling water to produce 26 inches vacuum in the fifth effect.

All of the bodies have straight side sections 11 feet high. The diameters of numbers 1, 2 and 3 are 6½ feet. The diameter of number four is 7 feet and number five is 9½ feet. Number one body contains 347 stainless steel tubes, 2 inches O.D. by 16 BWG. Each of the other four bodies contains 370 carbon steel tubes 2 inches O.D. 10 BWG. Each body has a total heating surface of 3700 sq. feet. All tubes are 22 feet long. Overall height of evaporator bodies is 41⅔ ft.

A Barometric jet condenser removes 23,200 lbs. of vapor per hour from the fifth effect. Complete instrumentation for the evaporator was provided by Foxboro.

Mason-Wellan steam control stations reduce pressure from 175 PSI to the 35 PSI used in the evaporator.

Heavy liquor from the evaporators is pumped to the cascade evaporator located in the recovery building. This building is 75 feet long, 43 feet wide and 88 feet high. 350 tons of structural steel were used in the construction. The foundation, basement and seven other floors are of reinforced concrete. Roof and sides are of corrugated asbestos siding. Window frames and sash Truscon bonderized steel.

This building is equipped with a Humphrey Manlift which provides constantly available vertical passenger transportation to all seven floors and the basement.

The D. J. Murray Cascade evaporator is equipped with a single wheel, 11 feet diameter by 14 inches face, driven by a 30 H.P., 900 R.P.M. motor. A 4 to 7 Falk Reduction gear provides a disc speed of 225 RPM. The machine is equipped with water cooled bronze sleeve bearings.

The unit receives 44,000 lbs. per hour of heavy liquor at 50 percent

solids, 275° F., which it concentrates to 62-65 percent slide. The temperature of the gas entering this machine is 470° F. The exit gas temperature is 275° F.

Link-belt screw conveyors and bucket elevators carry salt cake from freight cars to a storage silo and then to the mixing tank, where it is added to the heavy liquor from the cascade evaporator.

The recovery furnace is a Babcock & Wilcox modified Tomlinson unit with a two drum boiler having 12,970 sq. ft. of heating surface and generating 86,800 lbs. of steam per hour at 200 PSIG.

The furnace is provided with Diamond, fixed and retractible "IX" soot blowers, operating from 250 PSIG air pressure.

The recovery furnace stack is made of welded steel plates and is six feet diameter by 60 feet high.

Smelt from the recovery furnace drops into an enclosed dissolving tank equipped with a stack 24 inches diameter and 84 feet high.

Green liquor from the dissolving tank is pumped to the Dorr continuous causticizing system, consisting of a line feeder and slaker, three causticizers and two four-compartment three-tray thickeners used respectively as white liquor clarifier and lime mud washer. The system also includes a lime mud storage tank equipped with agitator; two milk of lime pumps; four liquor pumps; five thickener underflow pumps; two lime mud filter feed pumps; one green liquor heater; one wash water heater and one six feet long by four feet diameter Oliver sludge filter.

Provision is made for a lime kiln, green liquor clarifier and dregs washer to be added at a later date.

The four-compartment, three-tray, thickeners are both 22 feet diameter by 24 feet deep. The causticizers are all eight feet diameter by eight feet deep.

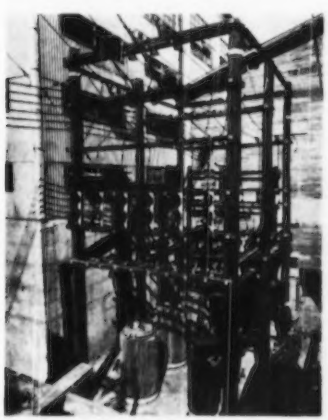


Figure 20—Transformer Sub-station No. 3. At Left is shown Corner of the New Pulp Washer Building.

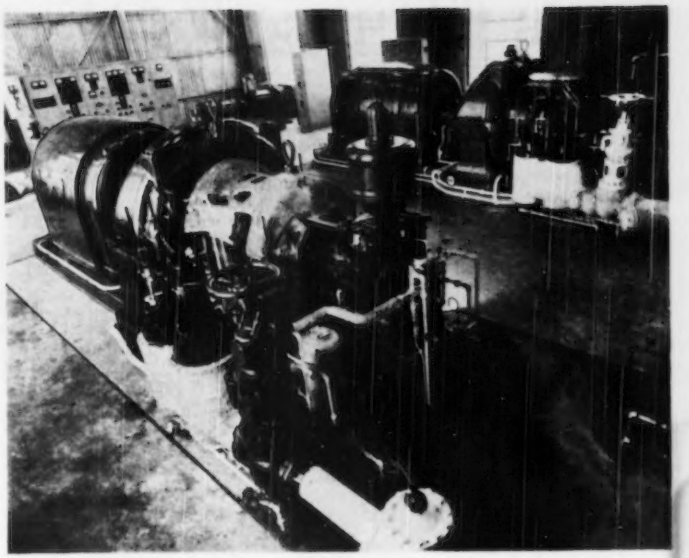


Figure 19—New Turbine Room with Both Turbines, the Switch Gear and Exciters Complete in Operation.

Until a lime kiln is provided, the thickened lime mud is being stored in sludge beds from which the lime will later be released and used as make-up in the kiln.

Future plans call for the installation of an electrostatic precipitator to further improve the efficiency of the recovery system.

Bark Burner

Bark from the barking drums is carried on a conveyor to a Babcock & Wilcox boiler equipped with an ABW Furnace, which produces 50,000 lbs. of steam per hour at 200 PSI. Sawdust and other combustible refuse is also burned in this furnace. This steam is combined with that from the recovery furnace and used for cooking pulp, for the paper machine turbines and dryers, black liquor evaporators, etc.

Steam Demand

The paper machine drives and dryers require approximately 50,000 lbs. of steam per hour plus 14,500 per hour for the Ross air heating system. The evaporators use 26,000 lbs. per hour, causticizing plant 11,500 lbs. per hour and the balance of the 136,800 lbs. per hour produced by recovery and bark boilers is used for pulp cooking and miscellaneous small requirements. The original mill steam plant has capacity of 55,000 k/hr.

Power Plant

Electric power supplying both the original paper mill and the new expansion is from a power plant which is on the site of the old saw mill located eight-tenths of a mile east of the paper mill. Operating conditions and location of the plant did not warrant selection of high pressure boilers and of extraction type turbines. Flexibility of operation, power capacity, and the availability of nearby log haul-in pond, which would serve as a new spray pond for cooling condenser water were the deciding factors.

In the old power plant, the boilers have a capacity of 2100 H.P. at 170 lbs. PSI operating in conjunction with three General Electric Company's turbo-generators, having a total capacity of 3250 KW. With the addition of two B & W integral type boilers, having a continuous rating of 50,000 lbs. superheat steam per hour at 175 lbs. PSI, 450° F.T.T. and 2-3000 KW Westinghouse turbo-generators, this provides a total capacity of approximately 10,000 KW with a firm capacity of 7000 KW.

The new power plant building is of concrete and steel construction. Corrugated asbestos roofing and siding enclose the building. General Electric Co. supplied the switchgear with Westinghouse supplying one spare 35 KW exciter.

From the power plant a new 4160 Volt transmission line had to be installed to transmit the power to four new mill sub-stations, where power is reduced to 440 volts for mill power service. All lighting is supplied from 440 V to 110/220 volt transformers located throughout the mill. All motors 200 H.P. and over are served by 4160 volts. Low voltage air-break switchgear distributes power from the transformers to individual G.E. Cabinetrol

centers located in each mill department.

Water Supply

The mill and power plant water supply is obtained from shallow wells and is of good quality with only a trace of iron, zero calcium, and 30 parts per million of silica.

One new well was drilled having a flow of 2200 G.P.M. This gives a total supply of approximately 8500 G.P.M. from four wells. The power plant is served by two independent wells one of which operates by compressed air.

In conjunction with additional water supply a new 100,000 gallon concrete reservoir was constructed. The mill is serviced by two 4500 G.P.M. reservoir pumps supplied by Warren Steam Pump Company. The new reservoir is interconnected with the old mill water system and reservoir so that excess water will not overflow to waste in the stream.

Number One Paper Machine

The 96" Fourdrinier which was originally installed in 1925 was overhauled and equipped with a 375 H.P. Westinghouse turbine, for driving the machine through a line shaft. This turbine takes steam at 150 PSI and exhaust at 35 PSI. The exhaust steam is used in the dryers. Three beaters and three jordans prepare the stock for this machine which now has a production of 50 tons per day.

List of Equipment and Suppliers

Machine Room

Paper Machine—160-inch Fourdrinier, P & J Flow Spreader, 120-inch High Van de Carr Slice—*Pusey & Jones Corp.*

Rewinder—*Pusey & Jones Corp.*

Paper Machine Drive—Multiple Generator Type, Sectional Drive with Electronic Controls—*General Electric Co.*

Prime Mover—800 H.P. Steam Turbine—*General Electric Co.*

Hood and Exhaust, System, Roof and Basement Heating and Ventilating System, Paper Machine Drive Ventilating System—*J. O. Ross Engr. Co.*

Overhead Crane—20 Ton Bridge Type—*Northern Engr. Works.*

Savveall System—8 feet x 10 feet Vacuum Type with G. E. Variable Speed Drive—*Oliver United Filters, Inc.*

Vacuum Pumps—V-Belt Drives with G. E. Motors—*Nash Engineering Co.*

Stock Chest Agitators—Propeller Type—*Shartle Bros.*

Stock Preparation Department

Jordans—24 Size, Direct-driven by 400 HP Motors—*Emerson Mfg. Co.*

Consistency Regulators and Screens—*Trumbey Machine Works.*

Decker—8-feet x 12-feet with G. E. Variable Speed Drive—*Oliver United Filters.*

Brown Stock Washing Department

Washers—8-feet x 12-feet Vacuum Type Washers with Intermediate Repulpers and Final Repulper. G. E. Variable Speed Drive — *Improved Paper Machinery Corp.*

Blow Tank Agitators—*Improved Paper Machinery Corp.*

Foam Breaker—*Improved Paper Machinery Corp.*

Stock Regulator and Stock Meter—*Improved Paper Machinery Corp.*

Deknotter and Conveyor—*Improved Paper Machinery Corp.*

Stock Chest Agitators and Drive——Propeller Type—*Shartle Bros. Machine Co.*

Digester House Department

Digesters—Four Tumbling Digesters and Drives—*Blaw-Knox Co.*

Chip Handling System—*Link-Belt Co.*

Wood Room

Barking Drum—12-feet diameter by 45-feet. Belt-drives 150 HP Motor—*Fibre Making Process.*

Chipper—1—88-inch 10 knife Chipper V-Belt driven by 350 HP 2300 Volt Synchronous Motor—*D. J. Murray Mfg. Co.*

Chip Screens—2—5-feet x 12-feet two Surface Ty Rock—*W. S. Tyler Co.*

Black Liquor Recovery Department

Evaporators—Five-body Quintuple Effect Self-supporting Evaporators—*General American Transportation Corp.*

Black Liquor Recovery Unit—1—175 Ton Tomlinson Recovery Unit with Murray Disc Evaporator and Bailey Meter Control—*Babcock & Wilcox Co.*

Chemical Feed—Supplementary Sulphite and Phosphate Feeding Equipment—*Worthington Pump & Machinery Corp.*

Salt Cake Handling—*Link-Belt Co.*

Deaerating Feedwater Heater — Spray Type—*Swartwout Co.*

Air Compressors for Soot Blowing System—*A. M. Lockett & Co.*

Air Receiver—500 p.s.i.—*Edge Moor Iron Works.*

Recausticizing Plant Equipment (Exclusive of Tanks)—*The Dorr Co.*

Process Steam Plant

Bark Burning Boiler—One Complete B & W Steam Generating Unit designed to deliver continuously 50,000 # of steam when burning bark fuel and 60,000 # per hour peak load. ABCO Forced Draft Furnace and Boiler Setting for above unit. Unit is arranged for auxiliary gas firing.—*A. M. Lockett & Co.*

Deaerating Heater—Spray Type—*Swartwout Co.*

Chemical Feed—Sulphite and Phosphate Feeding Equipment—*Worthington Pump & Machinery Corp.*

Power Plant

Power Steam Boilers—2 B & W Integral Furnace Boilers having a continuous rating of 60,000 # per hour each at a pressure of 175 p.s.i. and 450°F. Each equipped with Thermix Induced draft fan motor driven and stack. 4 Natural Gas Burners by Coppus-Dennis on each boiler—*Babcock & Wilcox Co.*

Deaerating Heater—Spray Type—*Swartwout Co.*

Combustion Control—*Energy Control Co.*

Chemical Feed—Sulphite and Phosphate Feeding Equipment—*Worthington Pump & Machinery Corp.*

Feedwater Heat Exchangers—*Alberger Heater Division of Howard Iron Works.*

Turbines—Two 3750 KVA Westinghouse Turbo-Generators. Condensing Type. These are reconditioned units located in the power plant which is remote from the pulp and paper mill. The generators have been rewound for 4160 Volts.

Water Circulation Pumps—1—10,000 gpm—Ingersol-Rand 150 HP direct motor drive. 1—8,000 gpm—Cameron Pump direct driven by 125 HP Dean Hill Turbine.

Spray Pond—Complete Piping System for 384 Heads—*The Marley Co., Inc.*

Tanks

Blow Tank, Miscellaneous Black and White Liquor Tanks, Foam Tank, Tramp Iron Trap, and Tanks for recausticizing System—*Ingalls Iron Works.*

Instrumentation

Instrumentation in Various Departments by—*Foxboro Co., Bailey Meter Co., and Energy Control Co.*

Pumps

Boiler Feed—Stock and Water Pumps—*Warren Steam Pump Co.*

Liquor and Chemical Feed Pumps—*Worthington Pump & Machinery Corp.* 12,000 gallons per minute Fan Pump with Variable Speed Drive—*Allis-Chalmers Mfg. Co.*

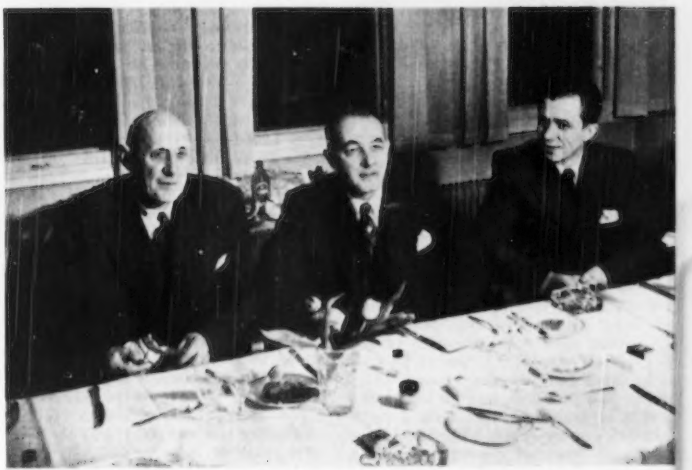
Vertical Sump Pumps—*The Deming Co.*

The Insulite Wallboard Mill at Kymi, Finland

H. K. LINZELL[1]

To most of us the mention of Finland brings to mind a wooded country of lakes and rivers on the fringe of the Arctic Circle. The feeling generated is one of friendship and one is apt to hear someone remark, "The Finns are fine people, they pay their debts." It is not generally known here that they are a free people as can be attested by the writer who has had the privilege of spending a Winter and Spring in that Northern country, where he enjoyed freedom to go where he pleased, bought American periodicals and newspapers on the newstands and listened to home broadcasts on the guest house short wave radio.

With a population of approximately three and three-quarter million, Finland has an area of 130,000 square miles, of which 12,050 square miles are water. About 20 percent of the land is above the Arctic Circle. The ice and snow are not enemies, but friends to the Finns. The elements provide a natural hard pavement for moving the heavy loads of logs by horse drawn sleds to the banks of lakes and rivers for floating down the lakes and rivers to the lumber mills, plywood and furniture factories, and to the pulp and paper mills and wallboard plants. With over 70 percent of the land area forest covered, Finland calls this source of wealth its "green gold." Its wood industries upon which its economy is based are as highly developed as any in the world.



Left to Right: Director H. Norback, H. K. Linzell, K. Halevuo, Plant Engineer.

The manufacture of insulation board was started in the United States about 1914 by the Insulite division of the Minnesota and Ontario Paper Co., and a few years later they developed a hardboard to compete with Masonite Presdwood. Mr. Backus, who originally promoted Insulite in the United States, saw the tremendous possibilities of Insulation and Hardboard in Europe and in 1931 built the first factory in Finland, known as the Insulite

Exterior of Insulite Co. of Finland Plant.

[1] U. S. Wallboard Machinery Co., New York, N. Y.

Co. of Finland, using some machinery of their own design, and some furnished by the United States Wallboard Machinery Co., who had for years been building plywood factories in Europe.

When the Insulation and Hardboard industry was well established, Finnish capital bought out the American interests, and in 1941 Enso Gutzeit O. Y. became the principal stock holder of the Insulite Company of Finland. Besides the Insulite plant in Kymi, Enzo Gutzeit O. Y. owns in other parts of Finland, ten other plants, including paper and pulp mills, lumber mills, plywood mills, a spool and bobbin factory, a chemical and by-products factory, box board factories, a joinery and door factory, a machine works, a large power plant and their own fleet of ships.

In 1946, following the war, W. Lehtinen, managing director of Enso Gutzeit O. Y. and Penti Halle, now technical director of the Enso Gutzeit kraft mill at Kaukopää came to the United States to purchase machinery for the modernization and expansion of their plants. In the final peace settlement with their powerful neighbor, Enso Gutzeit O. Y. lost their head office at Enso, a hydro electric plant which had just been built, a kraft mill, and a large proportion of their cultivated forest reserves. The soundness of their financial condition and the efficiency of their management is evidenced by their ability to survive this blow and be able to undertake a program of expansion and modernization.

Besides buying machinery for their paper mills and woodworking plants, Mr. Lehtinen wished to expand and modernize the Insulite Company of Finland plant which is located at Kymi, about 10 kilometers north of Kotka on the Gulf of Finland. Because of their old associations, they came to the offices of the United States Wallboard Machinery Co. in New York to secure information on the modern Combination Insulation Hardboard process developed by the writer and associates, and first put into operation in the United States Gypsum Co. plant at Greenville, Miss.

Impressed by the economics and sales advantages offered by the new process and product the Enso Gutzeit Co. ordered the machinery for a complete new unit for the Kymi plant.

The original wallboard factories made either insulation board or hardboard. By the new process both are produced in the same plant by adding a hardboard press and accessory equipment to the insulation board plant. This sounds very simple, and in fact it is, now that the details are all worked out. It is so simple that in the New Zealand plant, N. Z. Forest Products Ltd., built in 1945-46, the local personnel were making excellent commercial two-smooth-surfaced hardboard on a three minute over all cycle after only one week of operation, and after a year of operation they were pressing at the rate of 600 press loads of boards per day, averaged for a year, giving an overall pressing cycle of only two minutes, twenty-four seconds. During this period, all the board produced except 1.32 percent of rejects (including test samples) was salable.

The Insulite Co. of Finland, under the able direction of Ing. Norbäck was ahead of most of hardwood manufacturers in that they were already pressing a dry softboard mat to produce hardboard using the process developed by the Insulite division of the Minnesota and Ontario Paper Co. They were making a product superior in physical properties to any brand made in Europe. The board, however, was pressed on a screen and the pressing cycle was long compared to the Modern Process used in the plants built by the United States Wallboard Machinery Co.

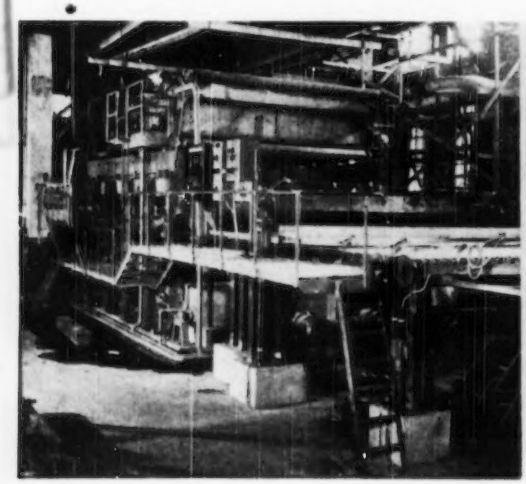
Process of Manufacture

The new Combination Insulation Hardboard Unit is now in operation at the Kymi plant and is producing excellent boards—both Insulation Board and Hardboard.

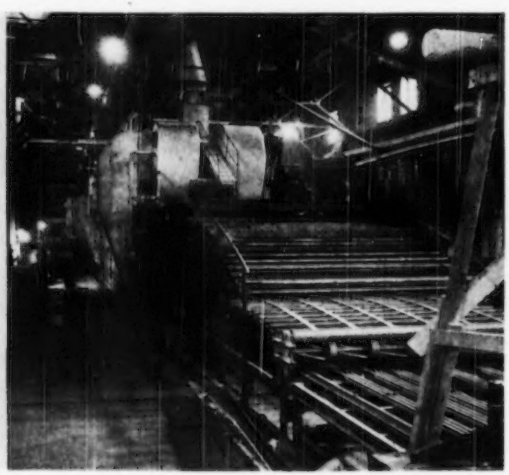
The process starts with the felling of trees in the forests. It starts, in fact, before that for Finland, conscious of its dependency on wood has a program of forest management which dates back to the end of the 18th century and was established officially by the state about 1850. In the years between the first world far and Finland's Winter War, forest management greatly improved the condition of the forests, assuring the perpetuation of their forest wealth. There was considerable depletion of the forest reserves during and immediately following the war years. An active resumption of their reforestation program should in the course of the next few years restore their forests and assure a future supply.

Though trees may be felled in all seasons except spring, the favored seasons are the fall and winter months. Felling has not been mechanized, it is still done in the old fashioned way with axe and saw. With these the Finnish woodsmen are expert. With the opening of the season the forests ring with the rhythm of axe blows. Skiing through the forests on the deep winter snow one finds lumber camps busy and meets horse drawn sleds piled high with logs being hauled over ice paved forest roads to the shore or a river or lake for floating down stream after the spring thaw and the breakup of the ice.

The Insulite Co. of Finland plant is near, but is not located directly on a



Downingtown Press Section



Coe Dryer and Automatic Unloader

river so their wood completes its journey to the mill by truck or rail. During the summer and fall months a supply of approximately 30,000 cords is gradually built up in a huge stock pile to carry them through the winter and spring until the new season's cut begins to arrive. The wood used at the Insulite plant is mostly aspen with smaller amounts of other species such as spruce and pine.

The logs are handled through slasher saws to give uniform lengths for the grinder. From the stock pile they are hand loaded as needed onto a conveyor which carries them to the Barker house where they pass through a Finnish built Drum barker. Waste steam is used at the barker in the winter to thaw out the frozen logs, and to help restore their moisture.

The barker is raked out continuously and the bark is separated from the water by means of a small drum filter. It is dewatered to about 50 percent moisture content in a screw type bark press, then is removed by conveyor and dropped into a truck or car for removal to the boiler house for burning.

The barked logs are carried by an overhead conveyor to the grinder room.

After grinding the pulp is passed through a bull screen to remove unground splinters. The pulp is diluted and flows through a settling system to eliminate sand, and metal scrap. The settled pulp is handled through rotary screens and finally dewatered in a battery of small drum type deckers.

The deckered pulp is rediluted to about 3 to 4 percent solids then drops into the machine chests located in the basement beneath the machines. Before it goes to the machine chest, size and any necessary chemicals are added and the pH carefully adjusted.

Insulite makes their own size, using byproduct rosin from the talloil "waste" at the Enso Gutzeit Kotka mill only a few miles distant.

Insulite has two softboard units, the original unit installed in 1931 and the new unit, which was started up in April 1950. The new unit which had a rated capacity of 150,000 square feet per day of ½" board is now operating at 170,000 square feet and is expected to go above 200,000 square feet. With proper dryer extensions, its capacity may be increased to 450,000 to 600,000 square feet per day.

The Forming machine is the Insulite Double Cylinder Type, as designed originally by the Minnesota and Ontario Paper Co. It has been modified slightly, chiefly in matters of structural design. The present machine consists of two open end 8 ft. diameter x 12'8" face perforated CI drums the surfaces of which are covered with first a coarse, then a fine screen wire mesh on which the sheet is formed. The drums are set in a machine tank with faces parallel and with one drum slightly above the other. Both drums are driven through the trunions which rest in bearings on the edges of the tank. The lower of the two drums is fixed in position. The bearings of the upper drum are on hinged supports, which permit the space between the drums to be increased or decreased according to the thickness of board being manufactured.

A mixing head box is arranged to provide an adjustable head of stock to the machine tank. The diluted pulp (½ to 1 percent solids) is divided in the head box, part of it flowing directly to the machine tank to supply the first drum and the other part bypassed beneath a part of the machine vat, flows into it beneath the junction of the two forming cylinders. Agitators within the vat keep the pulp in motion and assure good cross formation.

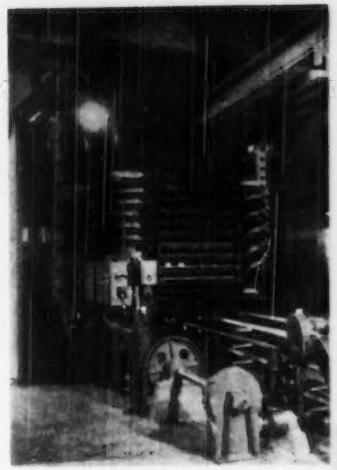
The sheet is formed on the under surface of the two cylinders and carries over the upper surface of the fixed (lower) cylinder. The filtrate flows out of the ends of the cylinders, and is recirculated to dilute the pulp coming from the machine chest. The formed sheet passes over a deckle board to a short roller table which conveys it to the Dowingtown roller press section.

As the wet sheet leaves the forming machine, it passes between a pair of screen covered rolls which give a screen or "fabric" textured surface to the face and back of the sheet. This makes the face and back identical in texture, or if desired a different texture may be applied on the face and the back.

The Downingtown press consists of four pairs of rubber covered press rolls, all driven. These rolls are 24", 26", 28" and 30" in diameter. The top and bottom felts are provided with showers, felt beaters, and suction felt rolls to continuously clean the felts. Pneumatic pressure with Foxboro indicating control instruments regulate the pressure on the rolls. The efficiency of the Downingtown press is attested to by a recent report from Finland that the moisture content of the sheet as it leaves the press section and enters the dryer is between 50 percent and 55 percent.

The sheet is cut to length as required, by a Coe Wet Saw which travels at an angle across the sheet. Its speed is synchronized with the machine speed to give a right angle cut without interrupting the travel. A short speed up section synchronized with the wet saw takes the cut sheets to the Coe tipple which automatically distributes them to the eight decks of the feed section of the dryer.

A Reliance AC-DC drive supplies DC current to the individual motors driving the forming machine to the roller table between the forming machine and the Downingtown press, to the motors driving each pair of rolls in the press section, to the motors driving the wet saw table, and the tipple. Vernier controls are provided for properly synchronizing the speeds of the several motors, also groups as well as individual stop and start sta-



Hardboard Press and Automatic Loader.

tions. The AC-DC motor generator set with its controls are housed in a cabinet unit with forced ventilation through changeable air filters.

The Coe dryer has eight decks spaced one foot apart which take 12 ft. wide sheets, with radiating steam coils between each deck, also above the top deck and beneath the bottom deck. The enclosed dryer length is approximately 160 feet long, and is divided into two air zones, with individual air circulation in each; the air flow is counter current in the wet end and parallel in the dry end. The air is recirculated through steam heaters located on top of the dryer.

Indicating recording humidity control instruments regulate the percentage of recirculation and exhaust and appropriately located angle and recording thermometers show the drying conditions along the dryer. A seal section at the wet end with a separate humidity controlled exhaust prevents the escape of humid air into the building.

The high pressure condensate system has made possible an excellent steam economy. The steam coming to the dryer is at 250 to 300 p.s.i. The condensate from the wet end flows into a pressure receiver, and the flash steam at a lower pressure supplies the steam along with makeup if necessary, to the dry end zone. The unit is so well balanced that little or no makeup steam is necessary for the dry end zone. The condensate from the dry end zone is collected in a second receiver, and is pumped back to the boiler under pressure. Flash from the final receiver is used for heating the barker in the winter. Less than two pounds of steam per pound of water are used for drying, and this together with the high efficiency of the Downingtown Press section is giving a very low drying cost.

The boards coming from the dryer

Girdler High Frequency Dielectric Heater.

are handled through a short cooling section to the Coe Automatic Unloader which delivers them directly to the dry saws which trim the sheets to the dimensions required for shipping or for delivering to the new hardboard plant.

The old softboard unit is similar to the new except that the original Coe Direct Heated Dryer was later converted to steam. It has four air zones, but no reheaters. It depends entirely on the radiating heating coils within the dryer for heating the air. The old Downingtown press section is spring loaded, and the drive unit is mechanical in place of a synchronized AC-DC drive.

In spite of the enclosed dryer length being about 350 feet the maximum production at the present time is only approximately 250,000 square feet per day. The steam economy is not as good as high pressure steam is fed to each zone, and the flash is not used in the dryer. The fact that the old wet press is delivering the board to the dryer at about 65 percent moisture in place of less than 55 percent as in the new Downingtown press also adds very considerably to the amount of steam used. It speaks well of the original machines however, that they have operated continuously all these years, and they have been producing excellent board.

A packing machine wraps the 4′ x 8′ 4′ x 10′ or other lengths boards in kraft in bundles of eight sheets. A crate frame is placed around each bundle and three strap iron bands properly spaced give a light weight export shipping crate.

In the Fabricating Department, much of the softboard is cut to tile with beveled edges, also to odd sizes for shipment to factories producing prefabricated houses.

Hardboard Plant

The dry blanks, or mats used for pressing into hardboard are produced in the new insulation board plant.

These mats coming from the trim saws are taken directly to the hardboard plant for pressing. Alternatively they may stand in storage for several hours before pressing. In any case, these boards are preheated before pressing by passing them through a Girdler High Frequency Dielectric Heat Dryer, which in the space of only a few minutes heats the boards up to the correct temperature for pressing. The HF unit operates entirely automatically, the doors of the oven opening and closing as required by the speed of operation of the press. The operators simply load the boards onto the feed table after which they are not handled until the pressed boards are removed by hand from the racks, and given their final inspection before packing and shipment.

Because this is the first unit in the world using High Frequency current for preheating the board, much of the automatic handling equipment was designed by the United States Wallboard Machinery Co. or built to their specifications.

The ten opening 4′ x 9′ press and other equipment is designed to give an operating speed with a pressing cycle every three minutes on ⅛″ hardboard; that is 480 pressing cycles per day on maximum production. On test runs an actual pressing time (under pressure in the hot press) of less than 1½ minutes was obtained. A feature of the hardboard produced by this process is that it is pressed between polished plates and is, therefore, smooth on both sides.

From the High Frequency oven the heated mats are loaded automatically into the individual decks of the press loader which is on an elevator and moves up deck at a time to receive each mat. When full it automatically positions itself with each heated hardboard mat in front of its corresponding press opening. Because the boards are completely dry they handle easily without the necessity of caul plates or screen wires to support them as they are handled through the High Frequency oven and on into the press.

When the press is emptied of its previous charge the press operator pushes a start button on his operators panel which causes the pusher to push the whole charge of ten boards from the press loading rack into the press.

The press is steam heated with flexible joint steam and condensate connections. With the very short pressing cycles, and the need for a uniform heat with temperature differences of only approximately plus and minus 1½° C from point to point across the platen, only steam or electric heat have been found to meet this condition and supply the amount of heat required for pressing. Steam heat is also quite economical when a special small automatic boiler is attached directly to the press as the condensate then returns through a receiver which is practically at boiler pressure, directly to the boiler. Insulite is at present using steam from their main boiler plant, but plans for installing a small boiler unit are under consideration.

The boards are pressed on polished steel caul plates which are fastened to the top and bottom of each platen. Sticking of boards is rare and generally only occurs in a spot here or there due to some foreign material in the mat. Such sticking if detected at once, before it becomes baked onto the plate can generally be removed by long handled copper chisels or steel wool. In a new plant it is general practice to use polished caul plates in the press. However, when the operators become familiar with the technique of pressing, it is feasible to dispense with the caul plates and press directly against the steam heated hot plates, which must first be polished for that purpose, as is done in the United States Gypsum Co. plant in Greenville, Miss.

The press has a hydraulic system designed for closing the press on the board in ten seconds and bringing the board up to required pressure in thirty seconds. For ⅛″ hardboard an additional minute is required under full pressure, then the pressure is released. Entrained gases come out with a puff when the pressure is released, and the hot boards at this point are floating on a film of hot gas. An automatic impulse from the feed end of the press floats the boards out of the discharge end where they are grabbed by extractors which pull them out onto the press unloading rack. The press unloading rack located on an elevator delivers the boards one at a time to a conveyor which in turn delivers them singly into the spaces of a humidifying rack.

The press loader and unloader and movement were built in Finland under the direction of Director H. Norback and Mr. K. Helevuo of the Insulite plant.

The humidifying racks each hold 60 boards. They are handled on buggies and a transfer track into the humidifier which holds approximately four hours of production. Temperature and relative humidity are automatically controlled so that approximately 6 per cent of moisture is returned to the board.

The racks are unloaded by hand as they come from the humidifier, are inspected and packaged for shipment. A further point of economy in this process is that there is no trim waste. The hardboard mats are cut to exact size before pressing and the hardboards are *not* retrimmed after pressing and humidification. The savings from this point alone may amount to from 3 per cent to 7 per cent of the furnish.

Production Costs

Labor costs in the hardboard plant are low. Depending on how the mats are handled from the Softboard plant dry saws to the hardboard plant, either one or two men are required for handling the board into the High Frequency oven. There is a press operator, and two men removing the boards from the humidifier. When operating

at full capacity there is usually one spare man attending the various machines, and as a relief for the other men.

The over all steam consumption in this process is also low. Insulite is not cooking their wood so no steam is used in the pulp. In the Coe dryer, they are only using about 1200 to 1500 lbs. of steam per 1000 square feet of board, and in the hardboard press approximately 300 lbs. per 1000 square feet. The humidifier, felt cleaning and other uses may add another 250 lbs. giving a total of only 1750 to 2050 lbs. of steam per 1000 square feet of board.

The total power is also low. Grinding requires about 18 HP per US ton per day of wallboard pulp, that amounts to 330 KWH per US ton. The motors in the softboard and hardboard plant, and including also the Dielectric heat add about 225 KWH per ton giving a total power of about 550 KWH per ton of hardboard. The board weighs only 650 lbs. per 1000 square feet so that amounts to only about 180 KWH per 1000 square feet.

In the above the power costs are relatively high because Insulite is grinding uncooked wood. By chipping and steam cooking followed by the use of Bauer Double Disc Pulpers the power used for pulping could be reduced from 330 KWH per US ton (using grinders) to 190 KWH per US ton thus decreasing the total power used in making hardboard by 140 KWH.

Using cooked wood, therefore, the total power would be reduced to only about 410 KWH per ton or 135 KWH per 1000 square feet. The steam used in cooking would amount to about 1.25 tons per ton of finished product.

The costs for power, steam and labor vary from place to place in Finland. It is not felt that these can be disclosed specifically for the Insulite plant. Average rates for Finland are as follows: Common labor gets about $.45 per hour.

The cost of power varies with the time of year and whether it is from Hydroelectric or from coal. A rate of $.005 to $.01 per KWH may be assumed.

As fuel is generally high priced, steam costs about $1.50 to $2.00 per US ton of steam. Coal is often supplemented by burning bark and any waste wood which cannot be profitably used elsewhere.

Old Hardboard Press

Besides the new hardboard process supplied by United States Wallboard Machinery Co., they have an old 20 opening 4' x 14' press which has been hand fed from an elevator and hand unloaded. It is equipped with fixed caul plates in the bottom of each opening, and screens on the top of each opening (under sides of the platens). The dry hardboard mats which may be a few hours old containing say 2 per cent moisture, or several days old and containing 6 per cent or more moisture are pressed without further drying or preheating. The over all pressing cycle has been more than 20 minutes. Mechanical loading and unloading is being installed which will bring the over all cycle down to 10 or 12 minutes compared to 3 minutes on the new machine.

In this old system the boards are loaded by hand into racks and baked for an hour to improve their strength, before they are humidified. In the new hardboard system baking is not necessary.

TABLE I

Sample No.	3		6		9		12		14	
Weight										
Pounds per 1000 sq. ft.	670		704		680		687		694	
Kg. per sq. meter	3.25		3.44		3.30		3.34		3.37	
Thickness										
Inches	0.115		0.122		0.117		0.129		0.118	
Millimeters	2.92		3.10		2.97		3.27		3.00	
Density										
Pounds per cu. ft.	70		69.2		70		64		68.6	
Kg. per cu. meter	1121		1109		1120		1025		1100	
Modulus of Rupture										
Pounds per sq. inch	10,300	9,380	8,840	6,220	9,750	6,860	7,440	7,380	8,280	7,340
Kg. per sq. cm.	726	662	622	437	686	482	552	519	583	517
Tensile Strength										
Pounds per sq. inch	5,800	4,330	5,300	4,270	6,720	5,040	6,500	5,270	6,560	4,930
Kg. per sq. cm.	408	305	373	301	473	355	457	371	462	347

Hardboard Strength

The figures in Table I taken from the production control record will give some idea of the physical properties of the new hardboard which is smooth on both surfaces.

Personnel

The writer could not conclude this article without a few words about the plant personnel, without whose cooperation the task of getting the plant into operation would have been much more difficult. The group picture was taken at the plant acceptance banquet, honoring the plant manager, Director Norback, the plant engineer chemical director, purchasing agent, master mechanics, construction foremen, chief electrician and others, all of whom had active parts in the building of the plant and getting it into operation.

The Finnish engineers, mechanics and electricians are the equal of any. The intricacies of the Dielectric Heating equipment, as high powered as many large radio broadcasting stations were readily mastered.

The workmen and workwomen are good and take pride in their jobs. A feature of all Finnish Plants is the social activity and sports program open to all employees. The writer had the privilege of being present at the annual ski tournament, the winners of which competed with the winners from other Enso Gutzeit plants. There are events for various age groups, men, women and children. The youngest contestant, only five years old, was the son of the plant engineer, Mr. Helevuo. In the handicap event there were several contestants over 70 years of age. The snow this last winter was good, about 30 inches where it was not packed down. The climate is not too different from that of some of our Northern States. The lowest temperature was —30° F with weeks of —10° to —20° F weather.

The plant has its own community group of houses where many of the foremen and engineers live with their families. The writer was comfortably housed in the company clubhouse which is also their guest house. The food is good with plenty of meat and fish, though American guests miss the green vegetables and fruits. Apparently the lack of these has no adverse affect on health. The writer did not even contract a cold through the winter in spite of the rigors of the climate.

An institution in every Finnish community in their Sauna (Finnish Steam bath). Having observed a guest's endurance of the climate, he is tested for his endurance of heat in the sauna, where the temperature on the upper bench is above 140°F, in a steamy atmosphere. The sauna is cleansing as is no other bath. Every pore is opened and flushed clean by copious perspiration and with a continuous condensation of vapors on the body, which is considerably cooler than the surrounding air.

Visitors returning from Finland remember them as great hosts and entertainers.

It is a man's country. After living with them and sharing their life for a half year, one understands why the Finns have been able to maintain their freedom while living next to their powerful neighbor.

Canadian Car Loadings

OTTAWA—Canadian Government announces cars of revenue freight loaded on the railways from the beginning of 1950 until August 12 advanced to a cumulative total of 142,186 cars of woodpulp and paper as compared with 126,149 in the similar period a year ago. The Eastern Division accounted for 124,192 this year as against 110,123 a year ago and the Western Division for 17,994 this year as compared with 16,026 last year in same period.

Gulf States Paper Co.

One of the most complete expansion and modernization jobs was completed at Gulf States Paper Co., Tuscaloosa, Ala., in the spring of this year.

This mill was originally built in 1928 and consisted of a kraft pulp mill with four digesters and a paper mill with one 234 inch Fourdrinier. In 1931 the mill at Braithwaite, La. was dismantled and all equipment including a 138 inch Fourdrinier was installed at Tuscaloosa. Other improvements have been made from time to time but the present major expansion was begun in 1946 under the direction of W. E. Penfield, Gulf States, Vice-Pres.

Other executives and key personnel in the mill include; Mildred W. Warner, president; F. M. Dickinson, vice-president and general manager; H. H. Yoder, vice-president in charge of public relations; W. P. Theilens, vice-president in charge of research; H. D. Warner, secretary-treasurer; L. M. Champagne, assistant production manager and superintendent; Robert R. Fuller, chief chemist; W. C. Washburn, purchasing agent; C. L. Phillips, chief engineer; Vance Miles, woodlands manager; V. T. Zwinak, traffic manager.

Both engineering and construction of the project was handled by H. K. Ferguson Co., Cleveland, Ohio.

The production has been increased from 200 tons per day to 350 tons per day of kraft paper. The number of digesters was increased from six to ten, thus increasing the pulp production to more than 350 tons per day. A new high speed Beloit Fourdrinier with all necessary auxiliary equipment was added to the paper mill.

Cooking

The digesters are equipped with fiber making process liquor circulating and heating systems for indirect cooking. Provision is also made for direct addition of steam to the digesters.

Pulp is blown into a new blow tank equipped with a Foster-Wheeler heat recovery system including a surface condenser and water heating system with hot and cold water storage tanks. Pulp was formerly blown into and washed in diffusers but these have been abandoned in favor of the blow tank and an IMPCO three-stage vacuum washing system consisting of three washers with cylinders 8 ft. diameter by 12 ft. long. A two-basket IMPCO vibrating knotter precedes the first washer.

Washed pulp flows to a battery of Trimbey rotary screens. The screened brown stock is then thickened on a pair of Oliver vacuum thickeners with a cylinder 8 ft. diameter by 12 ft. long. Thickened stock drops into the brown stock storage chest.

Bleaching

A portion of the pulp is bleached in a bleach plant which has also been modernized and expanded. This is an IMPCO three-stage system, consisting of low density chlorination, high density caustic extraction and high density hypochlorite bleach. Each stage is followed by washing on an IMPCO vacuum washer.

Washed bleached stock drops into a storage chest from where it is pumped to form lines of flat screens. Screened stock is thickened on an IMPCO vacuum thickener and is then sent to a storage chest.

Recovery System

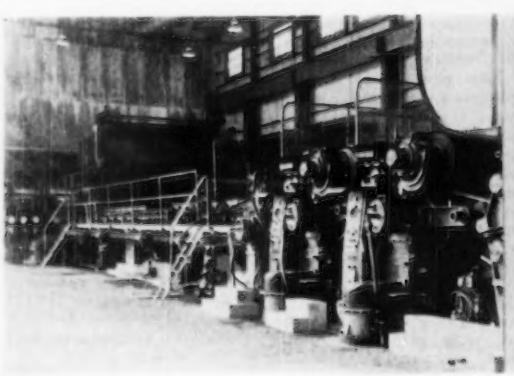
Each of the vacuum washers is equipped with a separate seal tank into which the black liquor is collected. The black liquor passes through a foam breaker and to a storage tank before being pumped to the five-body, quintuple effect Goslin-Birmingham evaporator which was recently installed.

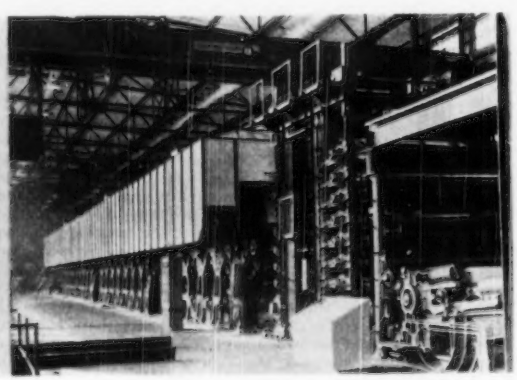
The black liquor is concentrated in the evaporator to 50–55 percent solids and then pumped to the D. J. Murray Cascade evaporator which further concentrates it to about 65 percent solids before it goes to the mixing tank where the make-up salt cake is added. The concentrated mixture is then pumped to the Babcock & Wilcox recovery furnace.

The recovery boiler is a 175 ton Babcock & Wilcox Heat and Chemical Recovery Unit built for 500 psi to produce 84,600 lbs of steam per hr at 660F and 450 psi at the superheater outlet when supplied with black liquor containing 45% solids having a heat value of 6500 BTU per pound dry.

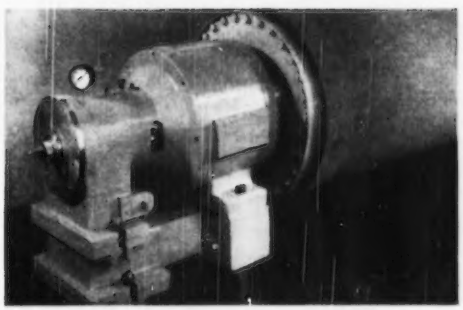
The unit is arranged with a B&W 2 drum economizer. It is one of the first units designed for and completely equipped with automatic soot blowers, including retractable units for the high temperature superheater zone. The units include IK soot blowers using steam as the cleaning medium and A 2 E units using air as the cleaning medium, arranged for sequential operation. The boiler is also equipped with Aerofin steam coil airheater, a Murray cascade evaporator and a Research

Left—Fourdrinier and press sections of the "Warrior." Headbox in background. Right—Full length view of the "Warrior" showing dryer sections with Ross hood and at extreme right the Beloit open side Calender stacks.

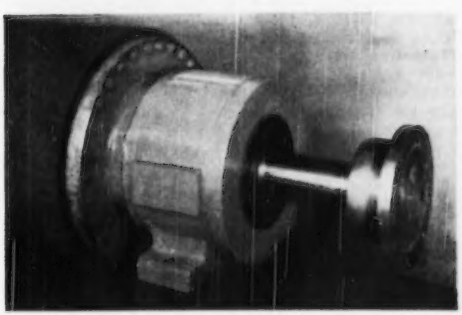




This new, improved Suction Press Roll steps up efficiency . . . profit!



Note these improvements: Stainless Steel end rings, stainless studs and nuts, generous size anti-friction bearings and housings, and positive locking strips for bonding rubber to centrifugally cast bronze shell.



Rugged steel forgings, fewer working parts and easily replaced packing are only a few of the features of the new Manchester rubber-covered drilled suction press roll.

MANCHESTER has designed this new Suction Press Roll that speeds up production, improves paper quality, gives you greater efficiency on the wet end, and increases your profits.

This rubber-covered drilled Suction Press Roll has every modern engineering advantage you need for top quality and full production. It will reduce your fuel costs in the dryer operation and more than repay the investment.

Write for our new illustrated catalog; and ask us to tell you more about the operating advantages of the Manchester Suction Press Roll.

A FEW OTHER MANCHESTER PRODUCTS

Drum Winders • Adjustable Shake Motion Pope Type Reels • Paper Machine Drives Size Presses • Drilled Suction Drum Rolls Drilled Suction Couch Rolls • Cylinder Moulds Complete Fourdrinier • Roll Grinding

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THE MANCHESTER MACHINE COMPANY

1709 CENTRAL AVENUE • MIDDLETOWN, OHIO

SPECIALISTS IN PAPER MILL MACHINERY AND COMPLETE REPAIR SERVICE

Corporation Cottrell Precipitator. In addition to the usual oil or gas burners for starting up or taking the unit off the line the unit is arranged with supplementary oil burners to compensate for any inadequate black liquor supply.

The black liquor burner mechanism is of the hoseless cam type arranged with single dual adjustment and quick acting gun mount for wide range of liquor operation.

The unit walls are completely water-cooled and arranged with a tight closure consisting of B&W K20 refractory insulation and welded steel casing all supported by the water-cooled tubes.

Smelt from the recovery furnace drops into the dissolving tank where it is dissolved in weak liquor from the lime mud washer. The green liquor thus formed is pumped to the green liquor clarifier which is part of the Dorr continuous causticizing system which was installed during the present expansion project. Overflow from the green liquor clarifier goes to the lime slaker where it contacts the reburned lime from the kiln and new make-up lime. Overflow from the lime kiln goes to the three causticizers arranged in series where it is kept well agitated to allow the reaction to be completed. The unsettled white liquor is then pumped to the white liquor clarifier. The overflow flows to white liquor storage tanks and the underflow is pumped to the lime mud washer. The overflow from here is used in the dissolving tank and the underflow is pumped to the Oliver vacuum sludge filter.

The underflow from the green liquor clarifier passes to the dregs washer. The overflow from this unit is used in the dissolving tank and the dregs are discarded.

Sludge from the vacuum filter is carried by a screw conveyor into the Traylor lime kiln which may be fired with gas or oil.

This expansion project also includes the installation of a 7500 KVA Westinghouse turbo-generator which produces 3 phase, 60 cycle current at 2300 volts from steam at 450 P.S.I. Previously installed generating equipment provides 9000 KVA to make a total of 16,250.

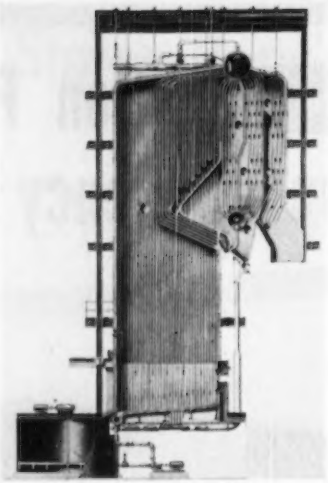
The additional steam requirements are provided by the B & W recovery furnace and a bark burner.

The bark and refuse boiler is a B&W Integral Furnace Type boiler to give 50,000 lb. of steam per hr at 150 psi. Arranged for bark burning and oil or gas firing.

The burners are of the circular register type arranged with "Y" jet oil atomizers and gas rings. The furnace floor, side and rear walls are water cooled. Bark is fired in a Hofft extension furnace having two 5'6" cells arranged with water-cooled grates and side walls.

Stock Preparation

Stock for the new paper machine is prepared in five Shartle, Miami No. 5 jordans. Machine broke is repulped in a new 14 ft. Dilts Hydrapulper. Other stock preparation equipment already installed in the mill includes 17 other jordans and four 1250 lb. beaters.



B & W—Tomlinson Recovery Unit, Stirling Type.

Five DeZurik consistency regulators were installed to control consistency of the stock for washing, bleaching and refining. DeZurik also furnished a great number of stock valves.

The 170" Beloit Fourdrinier machine at Gulf States Paper Corp., was built for a top speed of 1800 feet per minute.

The stock inlet of this machine was the first of its kind to be included in a complete machine. It is the air cushioned controlled flow Beloit inlet complete with motor operated rectifier roll and slice lift. A Beloit stream flow valve supplies patented cross flow distribution. All surfaces of the head box in contact with the stock are of stainless steel.

The 170" wide wire is carried on a Beloit removable Fourdrinier of which all main beams cross ties and so forth by stainless steel clad. All rolls are mounted on anti-friction bearings. The suction couch is a 36" Beloit.

In the press section are two straight through presses having 30" rubber covered suction press rolls, followed by a smoothing press. The top rolls are carried in anti-friction bearings, supported from a patented press framing which completely encloses the air diaphragm loading mechanism and in which are mounted the control instrument regulating nip presses. Felt rolls also are anti-friction bearing mounted.

The 43 five ft. dia. paper dryers and 12 felt dryers are carried in continuously lubricated self-aligning roller bearings. Back framing completely encloses the continuously lubricated dryer gear train. Rope feed equipment with automatic transfer between sections is used. A breaker stack and a press are located between dryer sections.

The calendar stacks are of the latest Beloit open side design allowing ease of roll changing and virtually plug free operation.

The patented Beloit reel is equipped with bearing cylinders both in the starting and winding positions to give accurate control of roll-to-drum pressure.

The machine is driven by a mechanical driving train including roller bearing mounted line shaft and enclosed hypoid air units with air operated clutches.

The new 170 in. Beloit Paper Machine is equipped with a Ross Transite and steel Hood arranged with exhaust fans on a mezzanine areaway between the old and new machine rooms.

The machine is equipped with a Ross Grewin System utilizing the latest design of centrifugal compressor apparatus for increasing the ventilation in the vapor pockets.

Additional systems furnished by J. O. Ross Engineering Corporation include a complete Roof Heating & Ventilating System with air supply to the basement together with a Calender Cooling System and a Trim Conveying System to handle the winder trim at high speed returning it to the broke beater in the basement.

List of Equipment and Supplies

Agitators: *Improved Paper Machinery Co.*

Air Compressor: *Ingersoll Rand Co.*

Bark Burning Boiler: *Babcock & Wilcox Co.*

Bark Burning Furnace: *Hofft Co.*

Bleach Plant High Density Reaction Towers: *Improved Paper Machinery Corp.*

Bleach Plant Washers: *Improved Paper Machinery Corp.*

Blow Tank: *Chicago Bridge & Iron Co.*

Brickwork and Refractories: *Fischer-Halliday Co.*

Broke Beater: *Shartle Bros. Machine Co.*

Brown Stock Vacuum Washers: *Improved Paper Machinery Corp.*

Cascade Evaporator: *D. J. Murray Mfg. Co.*

Condensate System: *Midwest Fulton Machine Co.*

Consistency Regulator: *DeZurik Shower Co.*

Conveyors: *Continental Gin Co.*

Cottrell Precipitators: *Research Corp.*

Crane 20-Ton: *Manning, Maxwell & Moore*

Digesters: *Blaw-Knox Co.*

Digester Blow Heat Recovery System: *Foster Wheeler Corp.*

Digester Heaters: *Fibre Making Process, Inc.*

Elevator: *Otis Elevator Co.*

Feedwater Heater: *Swarthout Co.*

Feedwater Pump: *Ingersoll Rand Co.*

CUT THE CLOTH TO FIT THE JOB

VORTRAP SYSTEMS ARE DESIGNED TO FIT A CUSTOMER'S REQUIREMENTS

Oswego Falls Installs Vortraps

FULTON, N. Y.—To meet present day demands for a cleaner groundwood pulp, by removing sand, dirt, pieces of stone, fly ash and a large quantity of bark specks and shives, a pulp mill Vortrap system was recently installed at Oswego Falls Corp. in Fulton, N. Y. This installation is made up of two 10" primary and one 4" secondary Vortraps, designed to handle up to 100 tons of stock at 0.75 per cent consistency.

The Vortraps are installed immediately after the bull screen, the plates of which have ⅛" round holes. The accepted stock from the Vortrap passes through conventional screening equipment and then to the wet machines.

Pulp Mills and Large Machines
Making Newsprint or Unbleached Kraft
Should Consider
Large Primary Vortraps (10 inch)
and Small Secondary Vortraps

ADVANTAGES—

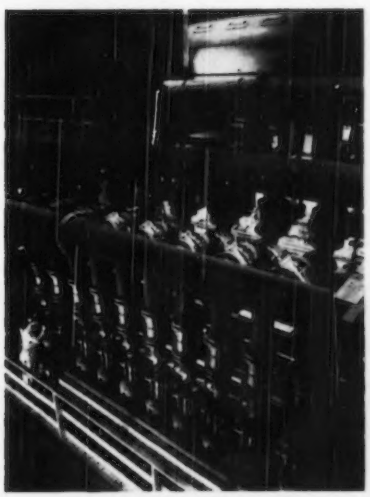
IMPROVED QUALITY FROM CLEANER STOCK

REPLACES RIFFLERS AND SIMILAR EQUIPMENT

REDUCED WEAR, FROM ABRASIVE DIRT, ON WIRES, SCREEN PLATES AND EQUIPMENT

LARGE VOLUMES HANDLED WITH LOW POWER CONSUMPTION

SMALL SPACE REQUIREMENTS



Primary Vortraps at Coosa Pines, Ala., plant · Coosa River Newsprint Co. 10-10" Primary Vortraps 3-4" Secondary Vortraps Designed for 12,000 GPM.

May we Study your Stock Cleaning Problems without obligation to you?

Write for Bulletin No. 219-K

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Feedwater Regulator: *Republic Flow Meters Co.*
Flat Screens: *Improved Paper Machinery Corp.*
Foam Breakers: *Improved Paper Machinery Corp.*
Forced Draft Fan: *American Blower Co.*
High Density Stock Tanks: *Stebbins Engineering & Mfg. Co.*
Hoods and Ventilating Equip.: *J. O. Ross Engineering Corp.*
Hydrapulper: *Shartle Bros. Machine Co.*
Induced Draft Fan: *American Blower Co.*
Induced Draft Fans & Stacks: *Pratt-Daniels Corp.*
Instruments: *Bristol Co.*
Jordans: *Shartle Bros. Machine Co.*
Machine Drive Turbine: *Westinghouse Electric & Mfg. Co.*
Meters for Recovery Unit: *Republic Flow Meters Co.*
Motors: *Westinghouse Electric & Mfg. Co.*
Oil Heater and Pumping Set: *Schutte-Koerting Co.*
Oiling System for Machine: *Bowser, Inc.*
175-Ton Recovery Unit: *Babcock & Wilcox Co.*
Paper Machine: *Beloit Iron Works*
Pumps: *Warren Steam Pump Co.*
Pumps: *Ingersoll Rand Co.*
Pumps: *Allis Chalmers Co.*
Pumps: *Shartle Bros. Machine Co.*
Reduction Gears and Drives: *Philadelphia Gear Works*
Roll Conveyor in Floor: *Engineering Products Co.*
Salt Cake and Lime Conveyors: *Brady Conveyor Corp.*
Saveall: *Oliver United Filters, Inc.*
Scales: *Howe Scales Co.*
Seal and Foam Tanks: *Chicago Bridge & Iron Co.*
Small Turbine Drives: *Elliott Co.*
Soot Blowers: *Diamond Power Specialty Co.*
Tanks and Steel Stock Troughs: *Snyder Tank Corp.*
Tile Linings: *Stebbins Engineering & Mfg. Co.*
Vacuum Thickener-Decker: *Improved Paper Machinery Corp.*
Winder: *Cameron Machine Co.*

Installation of New Equipment at Nekoosa-Edwards Paper Co.

Control Laboratories

An important step in the long-range planning of the technical department was realized in 1949 with the building and equipping of chemical laboratories in the Port Edwards and Nekoosa mills. The Port Edwards mill control laboratory is located on the first floor of the bleach plant, while the Nekoosa laboratory is in the former bleach plant in space made available through construction of the new kraft bleachery.

These laboratories are the technical department's mill headquarters. They have equipment and personnel for performing chemical and physical tests on pulp, and chemical tests on papermaking materials. When a problem arises it can be submitted immediately to the laboratory in the mill where trained chemists and their staffs can go to work on it with no time lost in transmitting samples and information to the main laboratory in the Port Edwards mill office building. These facilities complete another big step in the Nekoosa-Edwards program aimed at maintaining highest quality standards on all papers.

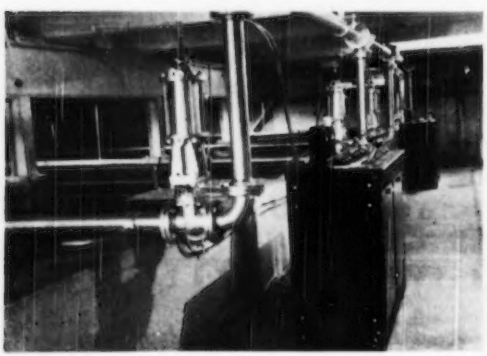
The control laboratories are also headquarters for pulp testing. The laboratory at Port Edwards contains chemical equipment for determining bleachability of pulp, a brightness tester for measuring the brightness of the pulp, and complete equipment including a beater, sheet mold and dryers for forming hand sheets to test the strength of the pulp.

The laboratory at Nekoosa contains similar equipment plus a pulping pilot plant with experimental digester, blow pit and screens. The Nekoosa laboratory also has a new set of sheet making equipment which is used only for research tests of pulp strength. The sheet making equipment used for routine testing of pulp strength is located in a smaller laboratory immediately under the new laboratory.

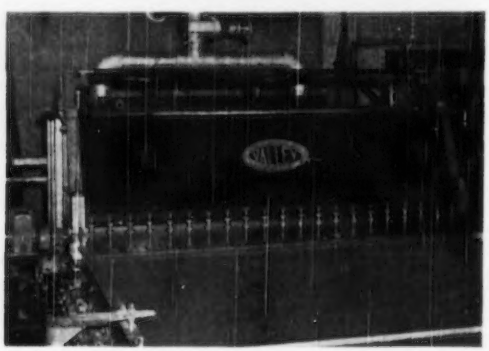
The latest step in the modernization of Number 4 machine at Nekoosa is the new stainless steel headbox and inlet, shown in the photograph, which was installed on January 30, 1950. The unit provides improved and even formation across the full width of the wire. It is designed to operate at rates from 220 to 800 feet per minute on a 127 inch wire.

Other recent improvements on Number 4 include the installation of Vortraps, a rubber-covered suction press, size press, eight additional dryer rolls, a center-wind drum reel, and a con-

Port Edwards Filter Plant.



New No. 4 Headbox.



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Choose "SOLKA" for extraordinary endurance and flexibility. This pulp is the foundation of really tough ledger papers. Performance has earned "SOLKA" first position in the sturdy-paper field.

Brown Company also offers you full use of its Technical Service Division. It will help solve your difficult paper problems at any time.

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Mills: Berlin, New Hampshire

stant tension winder. The machine's main dryer section has been completely reconditioned and a moisture control system has been installed. The improvements were effected step by step in order to prevent a material loss of machine time, and they have resulted in an increased range of grades that can be made on the machine.

Horizontal Hydropulper and Pulpmaster

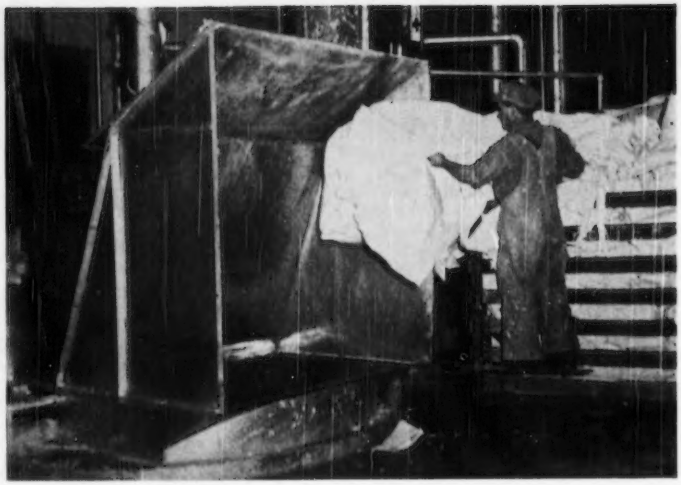
A Shartle horizontal Hydropulper and a Jones Pulpmaster have been installed in the Port Edwards beater room and are now contributing to improved efficiency. The installations are located in the Alexander machine room and are servicing Numbers 7 and 8 machines. They replace three obsolescent beaters.

Many advantages are resulting from the operation of the Pulpmaster and the Hydropulper. A faster and more efficient mixing of stock, color and chemicals is one of these advantages. Broke handling is facilitated by a more uniform use of broke throughout the runs. A most important improvement is the more accurate consistency control which helps maintain uniformity of the weight and quality of the finished papers.

The new installations have still other advantages over the beaters that were formerly used. A decreased power consumption results from their use because the devices operate at a greater speed and with more efficiency, and they are therefore not running constantly as was the case with the replaced beaters. Congested conditions have been relieved in this area providing more working space and improved appearance.

The Shartle horizontal Hydropulper is serving Number 8 machine and the Jones Pulpmaster services Number 7.

The Jones Pulpmaster recently installed in the Alexander beater room of the Port Edwards mill is shown in operation above. The device facilitates broke handling by allowing for a more uniform use of broke throughout the run. A speedier mixing of stock, color and chemicals is another important advantage. Because the Pulpmaster operates at a greater speed than the beater it replaced, constant operation is not necessary, hence a decrease in power consumption results.



Jones Pulpmaster at Port Edwards.

An improved control over the consistency of stock assists in the maintenance of uniformity of weight and quality of the finished papers. The Pulpmaster is currently serving Number 7 machine, but the arrangement provides for flexibility so that the device can be set up to service Number 8 machine. For further details about the Jones Pulpmaster and the Shartle horizontal Hydropulper please refer to the article in column 1 above.

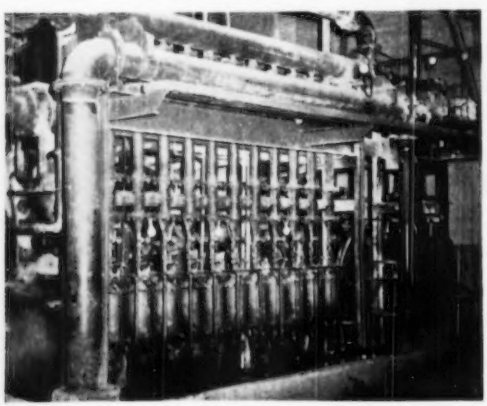
Vortrap Installation; Brackett Safety Trimmer

Recent improvements include a new Brackett Safety trimmer in the Port Edwards finishing department, and a new vortrap installation on Number 5 machine in the Port paper mill.

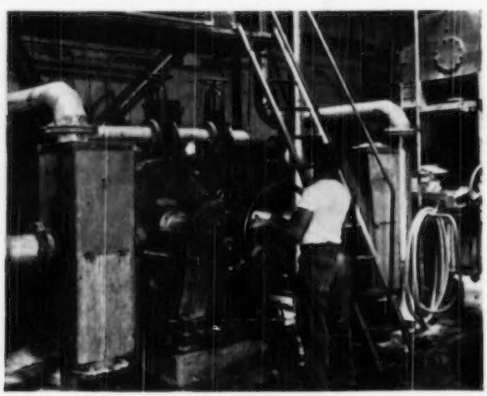
The Model A Brackett Safety trimmer is located in the cut-size or converting section of the finishing department. It is semi-automatic in operation and is used principally for trimming bond stock in sizes 8½ x 11, 8½ x 13 and 8½ x 14. It replaces an earlier model Brackett trimmer and allows for greater accuracy and precision in trimming.

A Seybold precision trimmer is located just ahead of the Brackett safety trimmer in the production line. The Seybold operator cuts the stock into strips 11, 13 or 14 inches and sends it on to the Brackett operator where it is trimmed the 8½ inch dimension. A conveyor takes the stock from the Brackett trimmer to the automatic ream sealing machine where it is wrapped, labeled, and then packed in cartons.

Vortraps on No. 5 Machine.



New Noble and Wood Jordan at Port Edwards



for processing its famous line of quality products, TAYLOR FIBRE COMPANY *uses*

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ROSS *Engineered Equipment*

Embodying Modern Mechanical Equipment Made By

JOHN WALDRON CORPORATION

The Coating of Paper and Plastic Laminates

By F. H. Burt

THE origin of the Taylor Fibre Company traces back to 1891, when the first sheet of vulcanized fiber was made at Wilmington, Delaware. The present main plant of the company is located at Norristown, Pa., and the principal products are vulcanized fibre, phenol fibre, laminated plastics in sheets, rods, tubes, fabricated parts and gear stock. This discussion con-

tractor knife coater is shown in the foreground, then two ovens each material on unwinding rolls between impregnation and coating stages before drying. Note stainless steel blending tanks in background.

pile productions, with some special jobs using nylon and urea varnishes.

The impregnating, curing, cooling and re-winding is done in a 22-ft. x 140-ft. well-lighted and ventilated coating room which houses a 50-ft. two zone dryer for 50-in. wide material, with a 20-ft. cooling ...

Material first goes through the Waldron machines for coating and impregnating, then through the various zones of the Ross Oven where controlled additions of fresh air, at constantly controlled desirable temperatures, are supplied to each zone, including a cooling zone. Capacity, 24000 lbs. of coated material daily.

At Taylor Fibre Company's La Verne, Calif. plant, huge rolls of materials such as paper, cloth, glass cloth, asbestos cloth, asbestos paper, etc. are impregnated or coated with various types of coatings for fabricating into a variety of finished products. Through the operation of a remarkable combination Ross-Waldron machine line, Taylor Fibre's range of production is extremely flexible with the closest of controls and top efficiency maintained at all times.

• • •

We invite your inquiry concerning your problems in connection with converting of paper, fabric or film. Write us. No obligation.

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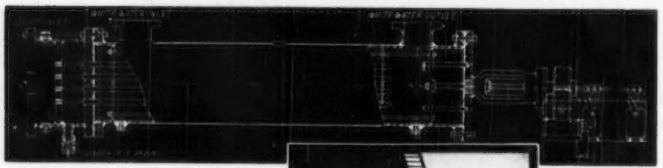
Paracoil Automatic SELF CLEANING WHITE WATER HEATERS

3 years of operating installations have demonstrated these results . . .

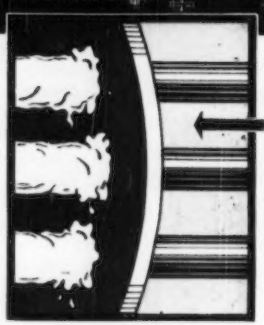
- **Increased production capacity due to higher sustained white water temperatures**
- **Savings in make-up water due to closed condensate system**
- **Elimination of heater outage time and attendant cleaning labor charges**

Designed to the specific PH requirements of the individual mill.



HOW IT WORKS

The transverse heater baffles, which also serve as tube surface cleaners, are connected by tie rods to the yoke plate, which in turn is connected to the drive mechanism at the right. The time controls close the motor circuit at predetermined intervals. The yoke plate moves each baffle longitudinally along the tubes, until the drive mechanism reverses the action and returns the baffles to their original position.



BAFFLES MOVE FORWARD AND BACKWARD LEAVING TUBES CLEAN AS A WHISTLE

Available in models for either manual, electric motor or hydraulic piston drive. Automatic types operate on adjustable predetermined time schedules.

Every Inch of Every Tube Is Thoroughly Cleaned At Every Cycle!

100% Heater Capacity Available At All Times!

Standby Heating Equipment No Longer Needed!

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The new vortrap unit on Number 5 machine aids in the removal of foreign material from paper stock by centrifugal action. As the stock comes from the stock pump it enters the top of the vortrap units and spirals down through at a terrific rate of speed.

Foreign material that is heavier than wood fiber, and too small to be eliminated by rotary and flat screens, is thrown out when the mixture hits the diaphragms near the bottom of each unit and reverses its direction. The dirt-free stock then proceeds to the paper machine head box.

Eleven of the 13 units are primary and are in parallel. The other two units are tailing units. As foreign matter is thrown out of the primary units, a small quantity of stock is thrown out with it. The secondary units serve to separate this stock from the foreign matter, resulting in further efficiency of operation.

Filter Plant

Another milestone in the Nekoosa-Edwards Paper Company modernization program was reached with the announcement that the enlarged and improved water filtration plant in the Port Edwards mill is now in operation. The capacity of the modern gravity type filter plant has been doubled; an increase from 2,500 to 5,000 gallons of Nepco Lake water per minute.

Started in August 1949 and completed in July 1950, the enlarged plant has a complete new section consisting of three double filter beds. Also new, is a coagulating basin with automatic chemical feed, enlarged water storage facilities, and automatic control apparatus. A modern pumping plant supplies the paper machines and the recently enlarged Port Edwards bleach plant with water filtered to a purity of approximately five parts of color per million. Separate lines are provided from the pumping plant to the bleach plant and the machines, and an alternate pump stands by for emergency pumping through either or both of the lines.

When the water is pumped from the Nepco Lake settling basin to the enlarged filter plant it enters a coagulation basin where it is treated with alum to support the formation of a floccule which assists in the filtering process. The water then passes through the filter beds and on through the pumping plant to the bleach plant and the paper machines. The filtering medium is known commercially as anthrafilt. It is specially prepared anthracite coal thoroughly washed and carefully screened to the proper uniform size.

The filter beds are equipped with Palmer filter agitators for backwashing in order that frequent cleansing of the anthrafilt may be accomplished with as little effort as possible. The filtering equipment was supplied by Infilco, Inc., Chicago. Worthington and Ingersoll-Rand pumps are used in the system. Controls are by Bailey Meter Co. and Builders Iron Foundry.

Improvements At Gould Paper Co.

One of the Northern New York mills that is keeping its plant fully modernized is the Gould Paper Co., subsidiary of Continental Can Co., Lyons Falls, N. Y.

Although this mill was originally built in 1895, during the last five years a complete modernization program has been going on.

Latest improvements include a modern three-story office building, a new finishing room with an enclosed loading platform and railroad siding, a new boiler plant and turbo-generator, and a continuous automatic peroxide bleaching system.

The existing plant includes groundwood and sulphite pulp mills as well as a three machine paper mill.

The groundwood mill is equipped with eleven three pocket grinders having a total daily production of 100 tons.

The sulphite mill is equipped with three digesters each producing 6.6 tons of unbleached pulp on an 8-10 hour cooking cycle, making a daily production of 40-45 tons.

The pulp is blown from the digesters into one of the three large blowtanks, each of which holds two blows. These blowtanks are vertical Cypress tanks having elliptical horizontal cross sections. These are equipped with false bottoms and are used for washing the pulp.

After washing, the sulphite pulp goes to an IMPCO vibrating knotter screen equipped with two baskets. Accepted stock from here passes to two parallel rows of flat screens. The accepted stock from these screens is flowed over a riffler and from there it is pumped through a battery of 20 vortraps. Then it passes through another series of fine flat screens. For thickening the sulphite pulp a new IMPCO thickener is used.

The groundwood mill is equipped with a new riffler system and a battery of centrifugal screens consisting of two knotters and six fine screens. The groundwood pulp is thickened by eight new rubber-lined IMPCO deckers. Deckers thicken both the sulphite and groundwood pulps before they are sent to the bleaching system.

Bleaching System

The new bleach plant which was built at a cost of more than $350,000 started operation in April of this year. It is typical of the modern peroxide groundwood bleaching systems but has the latest refinements. Not only is the bleaching system itself continuous and completely automatic, but it is the first system to have a continuous automatic liquor making system.

The system is designed to bleach 100 tons of groundwood or 130 tons of a combination of groundwood and sulphite pulps in 24 hours.

Sulphuric acid and sodium silicate are brought to the mill in tank cars and transferred to their respective storage tanks, each of which has a capacity of 12,000 gallons. Sodium peroxide is shipped in special stainless steel drums and transferred to a dry feeder having a capacity of 2,000 pounds. Magnesium sulphate is received in drums and in paper bags and is dissolved in water in a large storage tank from which it is drawn as needed.

The liquor make-up system consists of four tanks. Into the first tank, the magnesium sulfate and sodium silicate solutions, together with dilution water, are pumped at predetermined rates by Proportioneer pumps. This mixture is thoroughly agitated in tank number one. The overflow from this tank goes into tank number two, where the sodium peroxide is fed from the dry feeder at the required rate. The mixture again received thorough agitation and overflows into tank number three.

Another Proportioneer pump adds sulphuric acid to this tank at a required rate. The overflow goes into tank number four, from where it is drawn by another Proportioneer pump which feeds it to the thickened unbleached pulp at the proper rate just ahead of the double shaft mixer.

The sulphite and groundwood pulps, after having been thickened on deckers to about 3 percent consistency, drop into their respective storage chests. They are pumped from these chests through consistency regulators and thence to the IMPCO stock meters which proditce the desired ratio of groundwood to sulphite pulps at the required rate of flow. The mixture is then pumped to the IMPCO vacuum thickener on the top floor of the bleach plant. This unit has a cylinder 8 feet in diameter by 16 feet long. A pressure roll helps to obtain a high degree of water removal and produce a consistency of 15-16 percent. The thickened pulp drops into a repulper and then passes to a screw conveyor which carries it to a single shaft mixer where the mix is heated to a predetermined temperature. From here it drops to a double shaft mixer where it becomes thoroughly mixed with the bleach liquor.

This mixture drops into the tile lined bleaching tower which is 12 feet in diameter by 24 feet high. The stock moves downward in this tower and is removed from the bottom by two screw conveyors. Retention time in the tower is 2½ hours. The conveyor carries the bleached pulp to the neutralization chest where it is mixed with water and sulphurous acid. An automatic pH controller adjusts the rate of flow of the acid to produce a final pH of 6.8. The pH of the stock in the bleach tower averages 9.5. From the neutralization tank the stock passes to a large tile lined storage chest from where it is drawn for use on the paper machine.

All of the bleaching operations are controlled from a single panel which also contains all of the recording charts and indicating instruments.

Each step in the bleaching process is interlocked with every other one so that interruption of any part of the process automatically shuts down the whole system.

Normally a 2 percent bleach is used, that is, two pounds of sodium peroxide per 100 pounds of fiber. An increase of 10 to 12 points in brightness is obtained with the use of 2 percent sodium peroxide.

Although the pulp coming from the vacuum thickener is 15-16 percent consistency, dilution from the bleach liquor reduces the actual bleaching consistency to about 13 percent.

Power Plant

The power plant and electrical distribution systems have been remodeled and modernized. A complete new boiler plant has been built, consisting of two 450-pound Riley boilers having a capacity of 60,000 lbs. of steam per hour. Powdered coal, prepared in Riley pulverizers is the fuel used in the furnaces. The boilers are equipped to burn oil also.

Coal is brought to the plant in railroad cars on an overhead trestle. Conveyors carry it to large storage bins located on the top floor of the boiler house. Steam is produced at 400 p.s.i.

A new Westinghouse 2500 KVA turbo-generator provides electrical energy at 2400 volts, 60 cycle, 3 phase. This turbine operates at 3600 rpm., receiving steam at 400 p.s.i. Process steam is extracted at 125 and 45 p.s.i. The machine is equipped with a condenser, but it is not used when process steam requirements are normal.

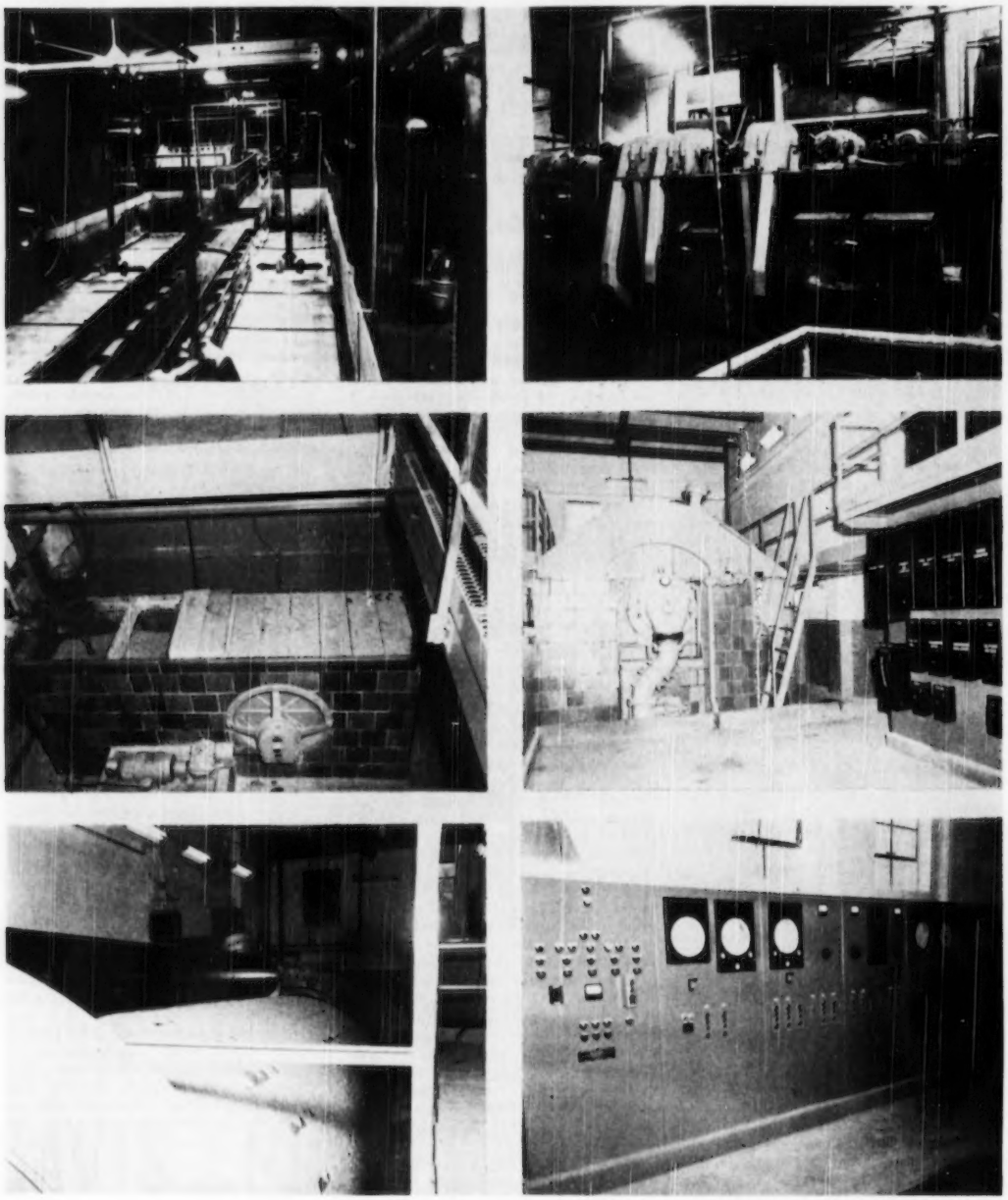
The power plant also includes four 1000 hp. water wheels directly connected to grinders. There are also one 1300 KVA generator and one 400 KVA generator driven by water wheels.

Electrical Distribution

A new radial distribution system consisting of a control station with five substations has been installed. Power

is sent from the central station to the substations at 2400 volts. From these points it is supplied to motors of 200 hp. and larger at 2400 volts. For motors below 200 hp., the voltage is reduced to 550. Transformers in the substations also provide 110 volt current for the lighting circuits.

The following additional new equipment has also been added during the past year on Number 3 paper machine: Hood and economizer installed by Ross Engineering Co.; Valley head box and inlet; rubber-covered suction press roll; Stickle drainage system; Vickery doctors on the calender stacks and dryers; complete Trimbey metering system; Poirier stock regulator; new IMPCO



Reading from top to bottom and left to right—Figure 1—Sulfite screen room. Vacuum thickener at left rear. Figure 2—Trimbey consistency regulator and proportioner. Figure 3—Impco stock meter and consistency regulator. Figure 4—Impco thickener for peroxide bleaching system. Figure 5—Stock on vacuum cylinder of Impco thickener. Figure 6—Control panel for bleaching system.

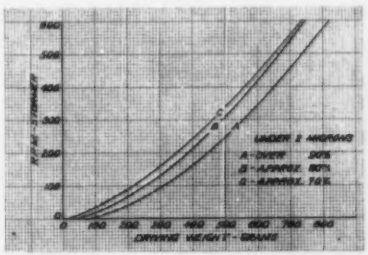
KAOLIN CLAY FACTS... *for Paper Makers*

NUMBER 5 OF A SERIES FROM THE J. M. HUBER CORPORATION LABORATORIES

Calendering coated sheets in an Appleton Super Calender.

WHAT AFFECTS THE FLOW OF A COATING MIXTURE? The flow characteristics of coating mixtures during preparation and subsequent application to the surface of the paper largely depends upon the so-called "working properties" of the clay. In many modern coating operations, such properties are considered just as important as clay brightness and finishing characteristics. Mineralogical composition, concentration of clay, particle size, particle shape and the inherent ability of the clay to produce fluid suspensions through the mechanism of base exchange, all influence the flow characteristics of clay-water systems. The selection of coating clays on the basis of flow characteristics depends on the type of coating operation. Those processes requiring highly concentrated clay systems use the so-called "free flowing" clays, while the more viscous type of clays are often preferred in coating operations where high concentrations are not essential.

PARTICLE SIZE INFLUENCES CLAY-ADHESIVE FLOW In clay-adhesive mixtures, particle size is the predominant factor in controlling flow characteristics. The adjoining figure, compiled from data gathered by Huber technicians, shows the flow properties of coating colors prepared with a commercial grade clay from a selected crude. The formula used was 57.5% total solids with 17 parts of commercially modified starch to 100 parts of clay. In both starch and casein colors, the finer clays produce the more viscous mixture.



Effect of Clay Fineness on Flow Characteristics of Crude Clay No. 4 in a Starch Color (57.5% Total Solids).

Determining clay brightness with the General Electric Reflection Meter.

HOW COMMINUTION AFFECTS CLAY BRIGHTNESS Extensive studies in Huber Laboratories have shown that the degree of comminution affects the brightness of a clay. Coarsely ground clay has the lowest rating of all, while clays which are progressively refined through finer and finer screens show better and better brightness ratings on the GE Reflection Meter. A detailed study of this subject was made in the Huber Laboratories and published under the title "Brightness Determination of Paper Clays," by N. Millman, in the Paper Trade Journal, September 23, 1948.

Degree of Comminution	% Brightness
Lump clay crushed in a mortar	81.5
Lump clay passed through 60 mesh screen	82.1
Lump clay passed through 100 mesh screen	83.3
Lump clay passed through 150 mesh screen	84.1
Lump clay passed through 200 mesh screen	84.2

Have you received your copy of "Kaolin Clays and Their Industrial Uses"—new Huber 144-page technical reference book? Write on your company letterhead.

J. M. HUBER CORPORATION, *342 Madison Avenue, New York 17, N. Y.*

MINES & PLANTS—LANGLEY, S.C., GRANITEVILLE, S.C., AND HUBER, GA.

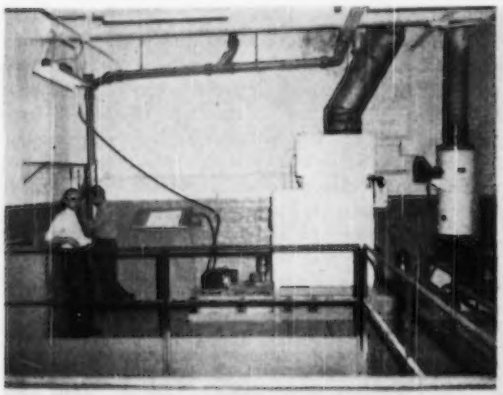
ONE OF THE WORLD'S LARGEST CLAY PRODUCERS

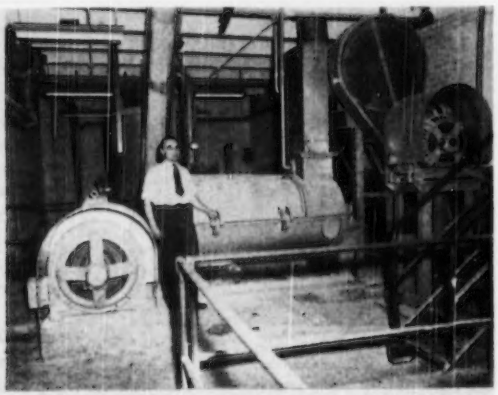
Savcall 8 x 16; Two No. 1 Jones Jordans; new Beloit couch roll; Ross-Grewin Vapor System.

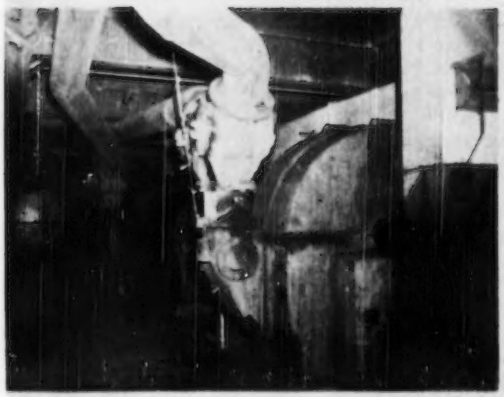
A new Beloit suction roll was installed on Number 2 paper machine and one No. 1 Jones Jordan was added to its stock preparation equipment.

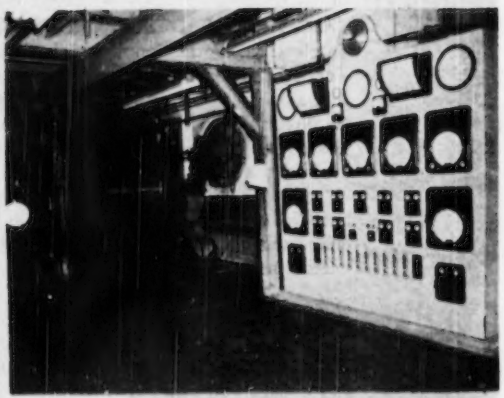
Number 1 paper machine received a new modern Beloit winder, a Sandusky couch roll, a Downington suction press roll, a new Stickler dryer drainage system, a new IMPCO 8 x 12 Savcall, a Ross-Grewin Vapor System and Beloit spiralled bevel drives. Nearly all piping has been replaced with stainless steel or transite.

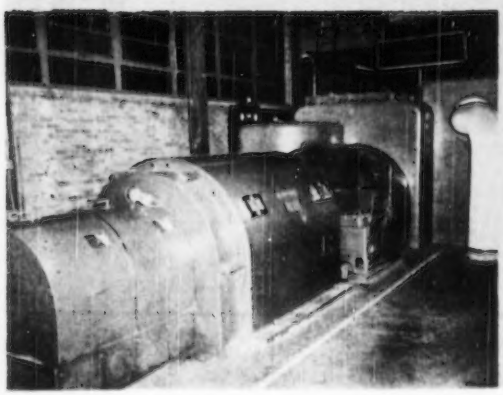
Key personnel includes: Lester J. Smith, manager; John E. Kelcher, chief engineer; R. A. Premo, chief chemist; F. Olm, paper mill superintendent; R. Lear, sulphite superintendent; and K. Snyder, groundwood superintendent.

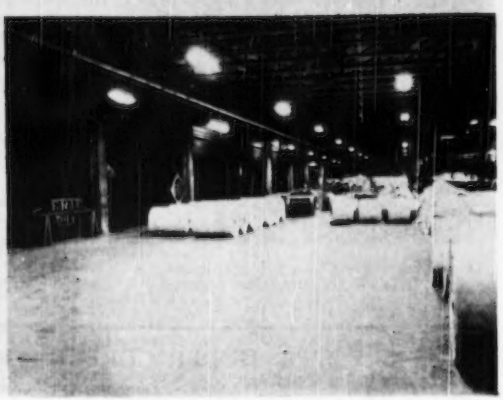




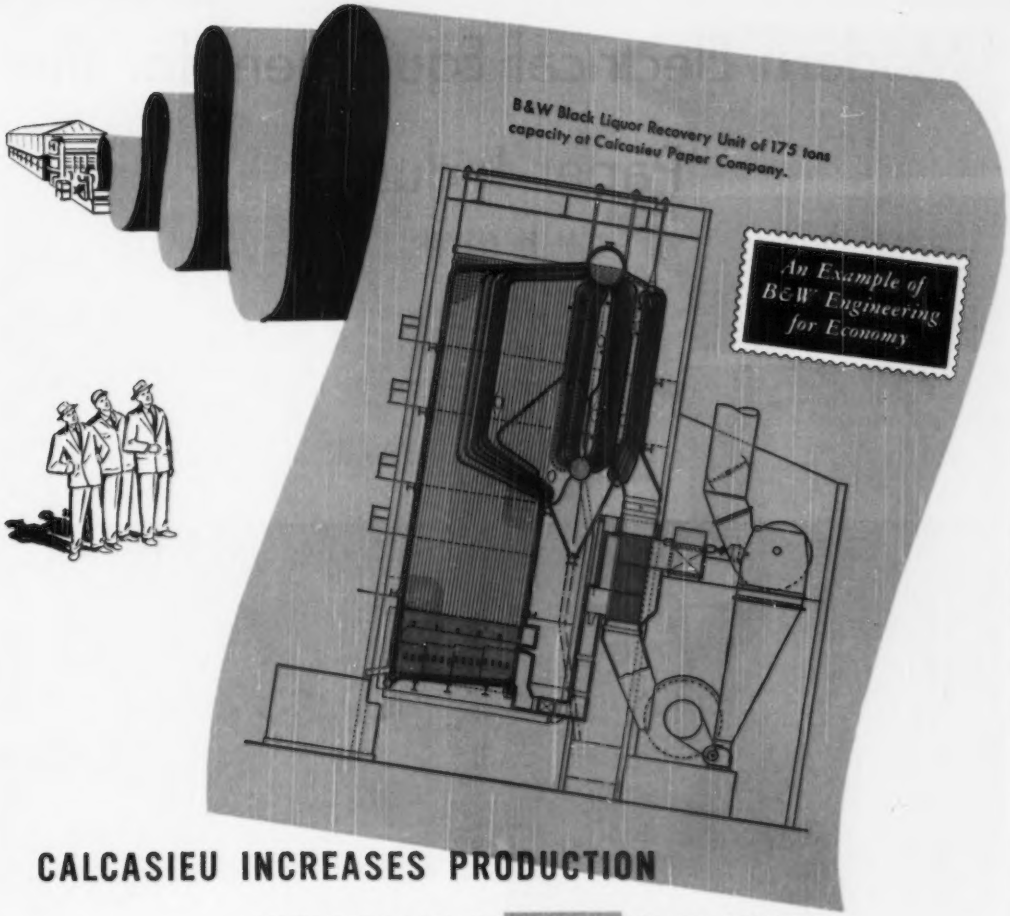








Reading from top to bottom and left to right—Figure 7—R. A. Premo, chief chemist, with bleach plant operator at control station. Figure 8—R. A. Premo in front of pulp mixer in bleach plant. Figure 9—Riley coal pulverizers in boiler plant. Figure 10—Furnace room control panel. Figure 11—Westinghouse turbo-generator. Figure 12—New enclosed railroad siding and loading platform.



CALCASIEU INCREASES PRODUCTION

...SERVED BY 4 NEW B&W UNITS

One of the most modern and up-to-date Kraft Mills in the country has recently been completed by the Calcasieu Paper Company, producing bag and wrap from log to finished shipment.

Chemical recovery and all steam-generating requirements at Calcasieu's modernized Elizabeth, La. plant are variously served by new B&W equipment. Part of a $6½ million expansion program, the following units are contributing to substantially increased daily plant capacity—from 60 tons in 1946 to 200 tons in May, 1950:

- *1* B&W Black Liquor Recovery Unit. Capacity: 175 tons, with 86,000 lb of steam per hr.
- *1* B&W Integral-Furnace Boiler, Type FJ, bark-fired, for generating up to 50,000 lb of steam per hr.
- *2* B&W Integral-Furnace Boilers, Type FJ. Capacity: 60,000 lb per hr each.

BABCOCK & WILCOX

B&W is proud that its equipment figures so prominently in this modern, highly integrated wood-use center . . . designed for its far-sighted management by the New York consultants, Alvin H. Johnson and Co., Inc.

P-756

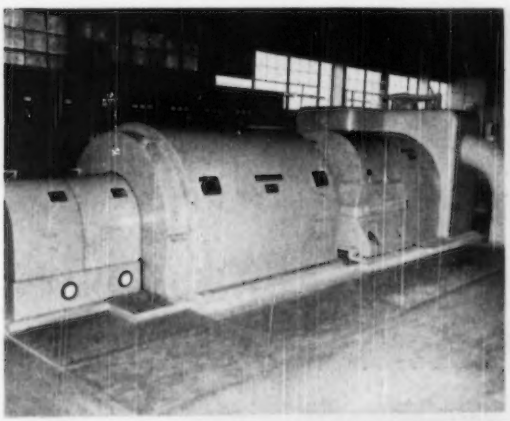
Modern Electrical Equipment for the Paper Industry

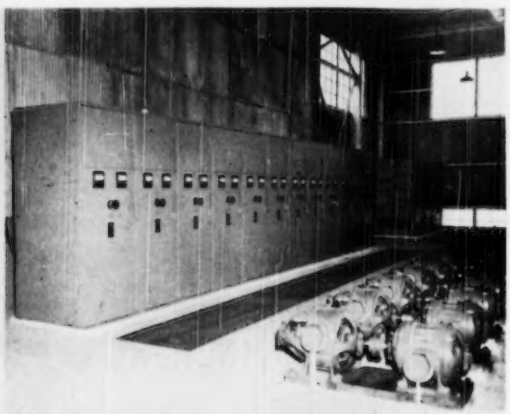
M. H. FISHER[1]

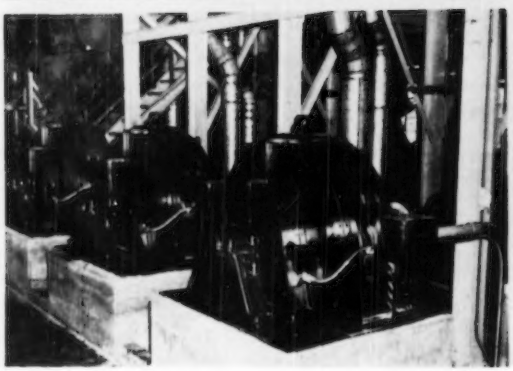
The paper industry, like all other industries, is concerned with the problem of increasing production, lowering cost and at the same time improving the quality of its product. The paper industry is now 85 to 90 percent electrified and electrification has played a large part in answering production, cost and quality problems. The ease of transmitting power around the vast area of a mill is one reason for the popularity of electrical equipment. The ability to mount the driving equipment near the driven machine, good efficiency, continuity of service and automatic operation contribute toward increasing use of electric power.

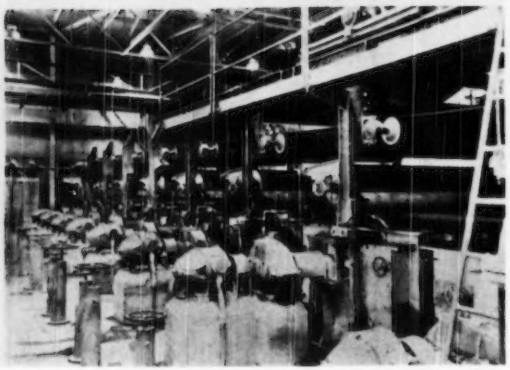
The source of all power in pulp and paper mills today is water and steam —the latter being, by far, the most used. Electric power is a by-product from the large quantities of steam required for the preparation of pulp and for drying of paper in the paper machine. By generating the steam at high pressures turbo-generators are used as reducing valves to produce low cost

[1] Industry Engineering Dept., Westinghouse Electric Corp., East Pittsburgh, Pa.

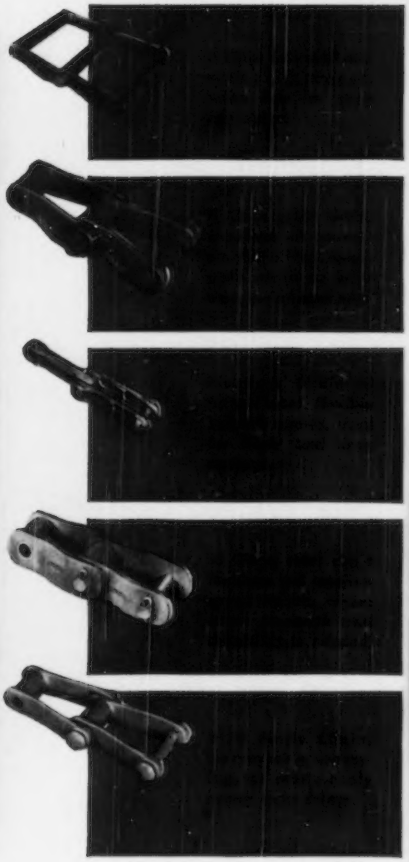




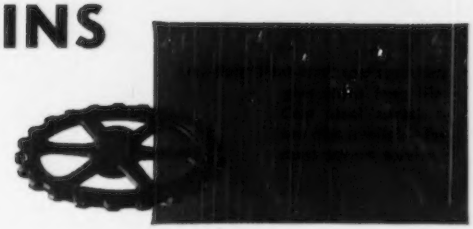




From top to bottom, left to right—Figure 1—One of two duplicate units rated 5000 kw, 80% P.F., 2300 volt, 3 phase, 60 cycle, single extraction Turbo-generator for operation at 400 psi, 650° F. temperature, and 50 psi extraction pressure. This Turbo-geneator set is used for supplying both electric power and process steam to a Southern Kraft Mill. Figure 2—High Voltage Control Center. These centers provide distribution bus and current limiting fuses located behind the blank feced access doors at the top of the starters. Starters are for 12—350 hp, 2300 volt, 80% P.F. Jordon Motors. Note the Power Center in the background and the individual exciters for the synchronous motors in the foreground. Figure 3—Synchronous motors with splashproof enclosures providing adequate protection against direct hosing. These 400 hp, 400 rpm, 2300 volt, 80% P.F. motors drive Jordans. Figure 4—Cylinder moulds and suction drum roll drives. Part of a complete wet end auxiliary drive consisting of drive motors for 8 cylinder moulds, a suction drum, 2 primary presses, 2 bottom suction primary presses, a top suction primary press, a top first main press and a bottom first main press.



Keep Production Going Up with LINK-BELT CHAINS



Designed for dependable service, Link-Belt Paper and Pulp Mill Chains have earned an enviable reputation for long life and trouble-free operation. From log pond to paper warehouse, there is a Link-Belt chain that is pre-eminently suited to the specific conveying or power transmission application.

The broad Link-Belt line of chains and sprockets affords a type to meet every need, readily available from stock at the nearest Link-Belt distributor or factory branch store.

LINK-BELT COMPANY 12,012

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Johannesburg. Offices, Factory Branch Stores and Distributors in Principal Cities.

LINK-BELT

Chains and Sprockets

electric power and at the same time furnish low pressure process steam. Since power is charged only with that percentage of the heat that is converted into electricity, the economy of this process is evident when it is considered that by-product power requires only about 4000 Btu per kilowatt hour. Straight condensing turbines require from three to five times this amount.

Years of experience in building turbine driven generators have resulted in the electrical manufacturer providing efficient and trouble free apparatus. Single units as large as 15,000 kw rating are now being installed in paper mill power houses. Electric power is usually generated at 2300 or 4160 volts and distributed at this same voltage through a power house feeder system to strategically located power centers around the mill.

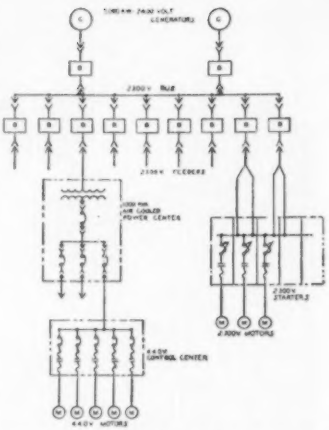
A power center is a centrally located substation on the terminus of a power line and consists of high-voltage protective equipment, transformer, low voltage switchgear and the necessary auxiliaries. These power centers are usually located indoors at a point best suited to supply present and future loads.

According to modern practice the 3 phase a-c power is fed from the power center to high and low voltage control centers. Motors rated 75 hp or above are most economically operated at 2300 volts (or 4160 volts), and those below 75 hp at 550, 440 or 220, thus there is a need for both high and low voltage control centers according to size of motors involved. High voltage combination starters in control centers may be applied to squirrel cage, synchronous, or wound-rotor motors on beaters, chippers, barking drums, pumps, Jordans, or motor generator sets when the ratings do not exceed 700 hp at 2300 volts or 1250 hp at 4160 volts, 50 or 60 cycles. They may be applied to systems capable of producing up to 150,000 kva at 2300 volts or 250,000 kva at 4160 volts under fault conditions. The power fuses used in these equipments provide the fast and positive short-circuit protection so essential on high voltage systems of the capacity usually necessary in paper mills. Under fault conditions the fuses act within .002 second (⅛ cycle) to limit the flow of current and to completely interrupt it in .008 second (½ cycle). This very fast action protects the starter circuits and components from damage, permitting use of contactors suitable for the repetitive operations motor starting service requires.

A low voltage control center is composed of starters for low and medium rated induction motors applied to pumps, fans, blowers, valves and the like. These starters are usually of the combination full voltage or reduced voltage type, non-reversing or reversing.

Control centers save space near the machine, reduce maintenance and provide greater flexibility. By grouping all starters in these convenient, safe and compact control centers, away from the machines, only the control stations remain in the work area. These control stations when located near the machine can be water, gas or dust-tight stations as required by conditions around the machine. The control center housing the starter may be removed from the work area, and need only be of NEMA type I construction since it will be in a room free of excess moisture, fumes or dirt as well as mechanical hazards. If it is desired to rearrange the work area near the machine, the starters and their wiring need not be affected. New or additional starter units can be provided for future expansion. Each starter is in its own isolated compartment providing safety and easy inspection.

A large part of the installed capacity in the paper industry is made up of standard squirrel cage, wound rotor and synchronous motors. The development of suitable enclosures, protective finishes and winding insulations have made possible the location of these motors adjacent to the machines that they power, thus affording the most economical and convenient machine layout. These motors and their associated starters are rugged and dependable and they provide long and



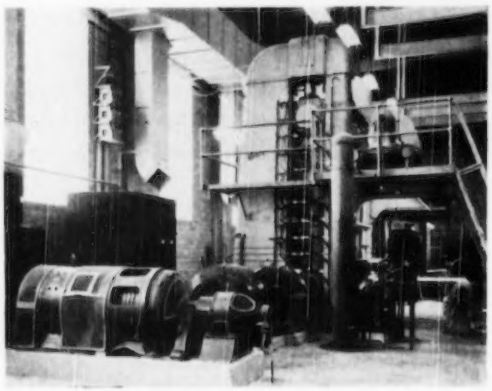
Schematic of electrical distribution system for a modern pulp and paper mill.

trouble free operation for such equipments as pumps, screens, conveyors, agitators, chippers and other similar drives.

The new all steel induction and wound rotor motors with prelubricated bearings are enjoying wide acceptance in the paper industry. The elimination of the necessity of greasing insures that the bearings are properly greased, not overgreased, and free from dirt and grit normally encountered with shop handling and periodic lubrication. The extra strength provided in these motors protects them from mechanical damage and the compact design provides ease of handling and mounting in restricted spaces.

There are many applications for which a single speed induction motor is not suitable and for these applications the electrical manufacturer has provided drives with special characteristics and features. These applications include drives required to operate over a large speed range, drives required to hold speed accurately and drives required to hold torque or tension.

(Continued on page 167)

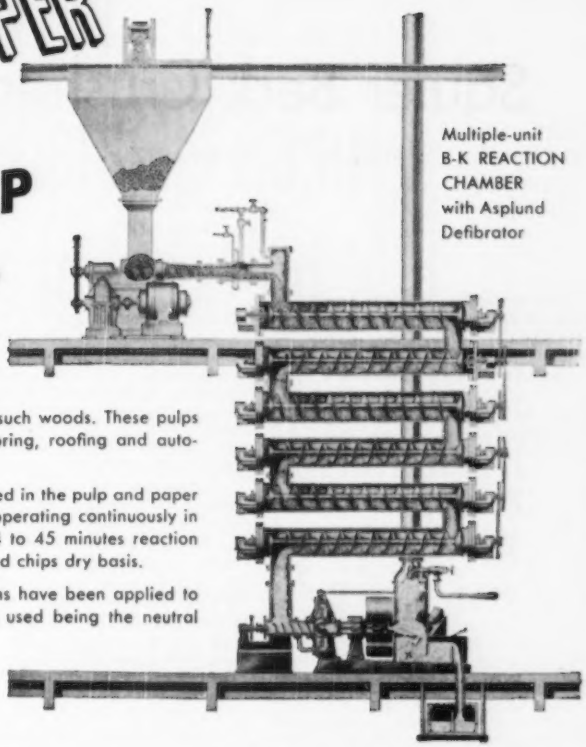


Right—Modern Supercalender with 150 kw direct current generator, exciter and synchronous motor in the foreground. Synchronous motor starter and enclosed d-c control panel are behind the M-G set. 200 hp drive motor operates into a speed reducer to power the Calender. Note the gearmotor driving the synchronized core type wind-up reel. Rototrol threading speed control is provided for the Calender drive and Rototrol constant tension control is provided for the core type reel.

CHEMIPULPER

(Patented and Patents Pending)

PRODUCES UNIFORM PULP at low cost . . .



Multiple-unit B-K REACTION CHAMBER with Asplund Defibrator

The Chemipulper produces, continuously, grades of pulp to meet specific requirements, using either hard or soft woods, or mixtures of such woods. These pulps are used for making .009 for corrugating; flooring, roofing and automotive felts, and insulating board.

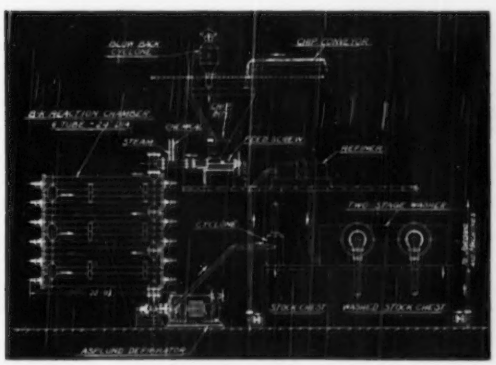
More than fifty operating units have been installed in the pulp and paper industry . . . units built with from 2 to 8 tubes, operating continuously in 150 to 175 p.s.i. steam pressure range; from 4 to 45 minutes reaction time, and handling up to 100 tons a day of wood chips dry basis.

Several chemical agents of varied concentrations have been applied to the Chemipulper operation, the most generally used being the neutral sulphite and kraft cooking liquors.

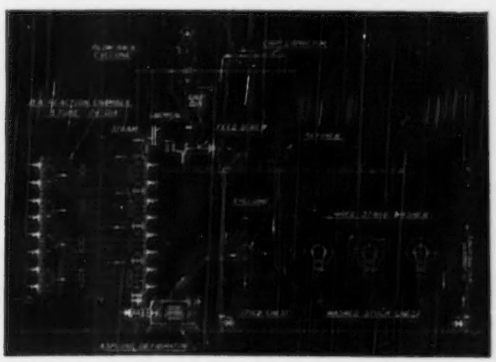
Write for new Bulletin

Three Chemipulpers are producing the semi-chemical kraft pulp which is 100 per cent of the furnish for the corrugating medium produced by Fibreboard Products, Inc., San Joaquin Division.

Our management wishes to express their thanks to the management of Fibreboard Products, Inc. for choosing Chemipulpers for their new San Joaquin Division mill after having carefully compared other methods.



Flow drawing of the CHEMIPULPER with auxiliary equipment for producing semi-chemical pulps for Corrugating Board.



Flow drawing of the CHEMIPULPER with auxiliary equipment for producing semi-chemical Neutral Sulphite and Kraft Pulps.

PAPER and INDUSTRIAL APPLIANCES, INC.
122 EAST 42 nd STREET ● NEW YORK 17, N. Y.

Squier Bark Crusher

EUGENE A. SCHWARTZ[1]

The new Squier Bark Crusher is the result of several years of engineering research and development, carried on by the Squier Corporation of Buffalo, N. Y., with the cooperation of a number of textile and paper mill engineers. It is aimed primarily at expediting the handling of bark from barking apparatus to boiler house, and at producing the desirable types of finished bark for which the industry has long been searching.

After considerable experimental work, an improved test unit was built at a cost of some $30,000 shortly after the war, and was installed in the plant in Buffalo. Here many carloads of wet bark were imported and crushed; studies were made, changes in design introduced and perfected, until finally the new bark crusher was presented.

The Squier engineering staff discovered somewhat early in their work that there was a considerable difference in the liquid extracted when bark with a remaining percent of 60 percent or 70 percent moisture was being produced as compared with the liquid extracted from bark in the range of 50 percent moisture on a bone dry basis. The latter liquid was very highly viscuous, appearing like heavy blackstrap molasses and requiring an entirely different design of unit than when producing barks of higher moisture content where the liquid was watery and readily separated.

In studying the requirements of a crusher for handling bark, it was determined that a unit was needed which had the following attributes:

1. A crusher which would take the raw bark from the barking or hydraulic barkers without requiring hogging or previous handling of any kind and feed this bark directly and continuously into the crusher, along with the reasonable sized chips, knots, and slashings which came from the barking drums.

2. A unit with a required high nip pressure in order to get the moisture down to 50 percent or possibly as low as 40 percent in the finished bark, completely preparing it for burning in one pass.

3. A design which could be readily serviced so that the doctors and other parts, if damaged by foreign materials, could be replaced quickly without causing shut-downs for long intervals for repair.

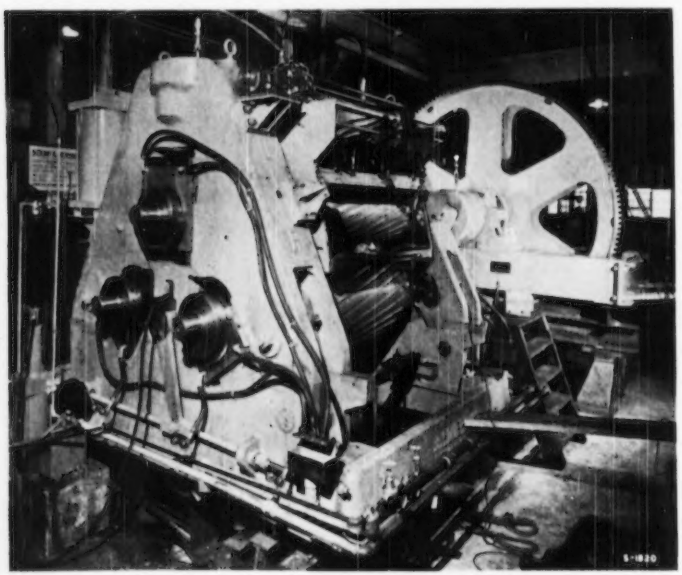
4. Because of the thick, highly viscuous nature of the liquid to be separated from the fiber, it was found essential to provide means of unrestricted flow of these liquids to the disposal trough. A design which would require that this thick liquid be forced back through the incoming blanket of fresh bark would not only increase slippage of feed but cause much entrapped liquid to be carried through the nip point with the fiber.

5. The Crusher should produce a finely-divided bark with ruptured fibrovascular bundles, so that in passing to the boilers it could be handled by simple fans without compressed air and conducted through piping. When handled in the furnace, it should flash dry readily in a pre-drying chamber if preferred, or could be fed directly on the fuel bed either in a steady stream or by means of the various spreader type stokers being presented on the market at the present time.

The machine, as finally developed, was able to accomplish all these objectives—some of them especially well—so that it met with instant approval from the many engineers who visited the plant and observed the test unit being operated.

A cross-section of the new Bark Crusher, relieved of much detail, permits us to discuss its salient features.

Referring to this drawing, we note first that it comprises three heavy alloy rolls, made of metal having a very hard but porous and rough texture, designed to wear rough. Like an emery wheel, these rolls have soft and hard particles; the soft particles wearing away faster than the hard, leaving a gripping surface to help the feed. A three roller mill was chosen primarily because it gave the effect of two crushings. Also, the first upper and lower feed rolls pass the blanket of fiber over the central doctor or turnplate 7, sliding it across the surface of this turnplate, and producing a



Squier Bark Crusher

NEW Mersize-Rosin combination

convenient new product to cut your costs

Your sizing costs can go way down, as Mersize plant operations shift down South to the Filtered Rosin Products Co. of Baxley, Georgia

You get an entirely new, extra-convenient Mersize-rosin combination that slashes costs two ways.

1. You use *less total size* to get the same results. One-hundred pounds of the combination, for example, does the work of 200 pounds of rosin size. Substantial economies can be demonstrated when you use 2 per cent size, or even less.

2. The combination is easy to handle. No mixing of Mersize and rosin. On large-scale operations the combination means much lower costs.

AND, MERSIZE ITSELF AT LOWER PRICES

Mersize will continue to be at least as economical as at present, for *all users, everywhere.* However, freight savings due to Southern operations will cut prices sharply for mills in the South and West.

Try MERSIZE, and the Mersize-Rosin combination at your mill — NOW

The products are ready, and Monsanto technicians are ready to demonstrate the qualities and economies of Mersize or the Mersize-rosin combination in your mill. Write Monsanto today for full information, prices, and technical arrangements. Please send the handy coupon.

Mersize: Reg. U. S. Pat. Off.

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SERVING INDUSTRY . . . WHICH SERVES MANKIND

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Please send me complete information on ☐ Mersize ☐ Mersize-rosin combination

Name & Title _____

Company _____

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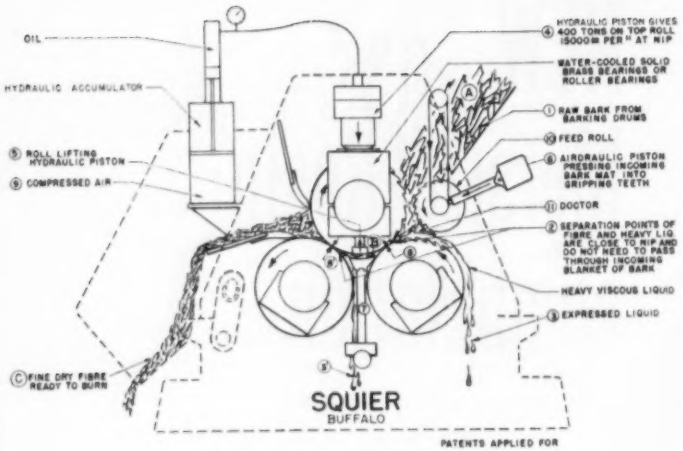
City, Zone, State _____


OIL
HYDRAULIC ACCUMULATOR
⑤ ROLL LIFTING HYDRAULIC PISTON
⑨ COMPRESSED AIR
④ HYDRAULIC PISTON GIVES 400 TONS ON TOP ROLL 15000# PER " AT NIP
WATER-COOLED SOLID BRASS BEARINGS OR ROLLER BEARINGS
① RAW BARK FROM BARKING DRUMS
⑩ FEED ROLL
⑥ AIRDRAULIC PISTON PRESSING INCOMING BARK MAT INTO GRIPPING TEETH
⑪ DOCTOR
② SEPARATION POINTS OF FIBRE AND HEAVY LIQ ARE CLOSE TO NIP AND DO NOT NEED TO PASS THROUGH INCOMING BLANKET OF BARK
HEAVY VISCOUS LIQUID
③ EXPRESSED LIQUID
⑦ FINE DRY FIBRE READY TO BURN
SQUIER
BUFFALO
PATENTS APPLIED FOR

Cross Section of Squier Bark Crusher

pressure on the fiber at B equal to the nip pressure at point 8, the liquid which would normally be squeezed out in both directions from the nip point, is stopped on the inside by the wall of fiber at B which is under pressure and therefore practically impervious. This results in the liquid being rejected by the nip, passing out over the roll at the separating point 2, and going down over the roll to point 3.

The blanket of fiber, separated from a great percentage of its liquid content, passes over the surface of the turnplate 7, to nip point 8' where it receives a second milling and squeezing action. The extracted liquid passes down behind the turnplate at 3' into the sluice.

The finished fine, quite-dry fiber, now broken into fine pieces, passes out over the doctor to C and into the conveying system chosen by the mill engineer. This may be a standard conveyor, it may be a flue gas drier, or a flash drier, or without any further treatment whatever, the bark may be conveyed by a fan to the feed bins over the boilers.

Another feature (patents applied for) of this crusher is the feed roll at 10. This power driven roller is grooved to mate with the heavy tooth grooves of the top roll. It swings on an arm so that by means of hydraulic pressure piston 6, it produces a control pressure against the incoming blanket of fiber, pressing the long slabs of slippery bark into the hooked teeth of the main roll and giving them a grip into the raw bark bed, which is one of the functions of feed performance by the Squier crusher. A doctor keeping this feed roll clean at point 11 also turns the compressed blanket of incoming raw bark into the nip of the rolls. The heavy extracted liquid flowing underneath this doctor produces the sharp separation which is a factor in the success of the machine.

This bark crusher itself is based on the designs of the Squier cane crushing mill: the triangle of forces produced by the crushing action between the three rolls is overlaid by a triangle of rugged steel (as indicated by the shape of the housing), which places all of these stresses in tension instead of bending, thus producing a super-strong milling unit. The shafts of these 28 in. diameter rolls are 14 in. diameter, of heavy forged steel ground to a mirror finish in the bearing. They are driven by means of Sykes herring-bone tooth gear reduction from an electric motor.

The matter of power required to operate this unit, or any unit with a high nip pressure, is based on the friction developed in the bearings under the load. This reduces the power required by any crushing unit to the same common formula. At lighter pressures the input demand horsepower is correspondingly less.

From the facts determined in the commercial size experimental plant, it was found that where temporary "heavier-than-normal" feeds are required to handle surges, the machine can be adjusted quickly to such changes in capacity. The pressure on the top roll, that is, the nip pressure, is under the constant control of the operator. By simple manipulation of the air pressure control valve, the pressure on the blanket of bark can be changed or released entirely in temporary emergencies caused by uneven feeds.

The general design of the housing permits it to be opened quickly, making it possible to replace any of the tips of the doctors or turnplates in a short space of time, these being designed with renewable tips.

In the opinion of paper mill engineers who have observed this unit in operation, the Squier Bark Crusher amply meets the five points previously established as preliminary necessities in the design of any bark press. In addition, it should be kept in mind that this machine handles the raw bark without preliminary hogging, and produces a finished ground bark which again requires no hogging before passing to the boiler.

The machine also lends itself very readily to use in multiple units. Future development may indicate that a bark of super dry nature is desirable, or solvents to further process the bark may be sprayed on at a point where the bark leaving the first mill is expanding and later pressed out by the second mill. These and other possibilities open themselves to owners of this crusher, regardless of how the industry develops the use of its bark.

It has been remarked that the bark coming from the Squier crusher closely resembles peat moss; also if this bark were to be used for making paper, wall board, or other materials, it is delivered in a nature and form which readily lends itself to further processing.

The Squier crusher has been applied successfully to the processing of a number of fibers and materials. With some changes in design of the grooving, it is being tested for separating pulps, in various stages of process, from their processing liquids and recovering such processed liquids in more concentrated form than by draining and washing.

These machines have been made with rolls of bronze, solid stainless steel, and many other alloys. Many of these units are now operating in a wide range of industries.

The Squier Corporation wishes to acknowledge the valuable cooperation of textile and paper mill engineers. Especially S. B. Roberts of the Celanese Corporation of America and Edgar Calnan and his associate engineers of the Ontario Paper Co., Ltd., and the Consolidated Paper Corp., Ltd., who furnished the test bark. Their knowledge of power plant fuel requirements did much to bring the development of this bark handling equipment to a successful conclusion.

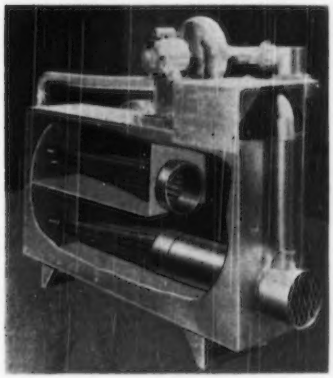
Albany Felt Increases Wages

ALBANY, N. Y.—Albany Felt Co. on August 19 granted an increase of six cents an hour, retroactive to July 10, and an extra cent to pay for the company assumption of employes' contributions to the state disability insurance program and improved holiday and vacation benefits. The intention of the firm to continue its pension plan will be noted in the contract for the first time. The firm recently agreed to consider increased wages if the cost of living should rise to a great extent. The agreement on basic terms for a new contract was reported by both company and union officials. Final details are being negotiated. About 1,000 hands are affected by the increased wage scale.

NEW EQUIPMENT

Aerodyne Dust Collector

The Aerodyne Dust and Fly Ash Collector is based on the aerodynamic principle of separation applied to dust control for pulp and paper mills. Basic unit is a slotted sheet bent to form a cone. When a blower is started, the air to be cleaned is passed at high velocity over filter surface. Aero-



dynamic forces are set up because of the design of slots, and the resulting action deflects the particles away from the surface. This force keeps the dust particles suspended in front of slotted filter surface, and the cleaned air escapes through slots. The suspended dust cloud is carried at high speed to outlet end of cone and withdrawn into a secondary circuit where it is precipitated and collected. Design of unit is described as simple and flexible. It can be set up in various locations and positions.

Chromatic Reflectance Standards

Sets of calibrated chromatic reflectance standards are now available for use with the multipurpose or other reflectometer employing similar blue, green, and amber source-filter-photocell combinations. Spectral reflectance curves have been drawn for each color of the set of 10 chromatic reflectance standards. These curves indicate the nominal spectral directional reflectance in percent relative to magnesium oxide as 100 percent. They are of importance because accurate tristimulus colorimetry at present can only be done with standards having nearly the same spectral selectivity as the specimens. Each set consists of 10 3 x 5-inch porcelain enameled iron panels having the colors, etched designations, and nominal values of reflectance and chromaticity as stated in Table of Standards.

New Type Pulpwood Car

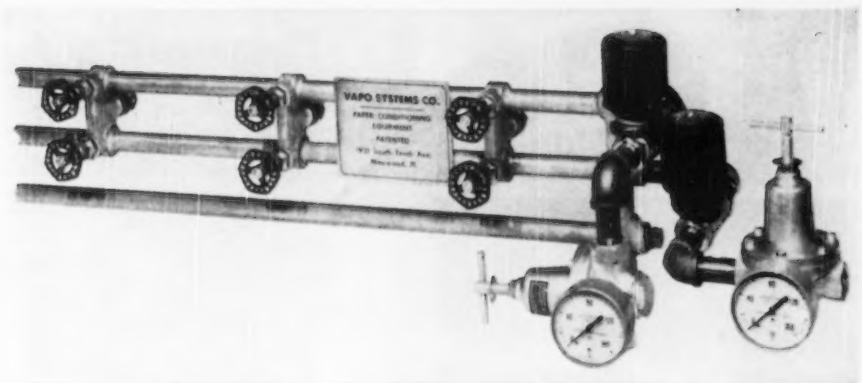
MOBILE, Ala.—The Gulf Mobile and Ohio Railroad has designed and begun manufacture of a new type pulpwood car that will haul a 22-cord load against the 13-cord load carried by the old equipment, it was revealed recently. One hundred cars are on order. The new car has the approval of the Southwestern Technical Committee of the American Pulp Assn.

Heretofore, pulp logs have been hauled on improvised cars, converted from other equipment. The rapid growth of the industry in the Gulf States has made necessary the development of a more specialized piece of equipment. It features a sloped and slatted floor for the removal of surplus bark enroute; a solid cast-steel frame to eliminate end bracing and permit the increased load. It also provides for mechanical unloading, and the lower frame simplifies loading from trucks in the field.

Conveyor Chain Oiler

The chain oiler was designed to overcome problems of conveyor chain lubrication. Solenoid-operated, the oiler feeds lubricant by gravity from a reservoir to a brush which rides the chain and spreads the desired amount of oil evenly. Through use of a friction lock, drop feeding of lubricant through sight-feed valves to brushes can be adjusted and adjustments retained. The solenoid valve can be wired across line of the driving motor which will turn the oiler on only when

(Continued on page 163)



VAPO SYSTEMS COMPANY

PAPER CONDITIONING EQUIPMENT

DESIGNED FOR PAPER MILLS AND CONVERTERS

MOISTURIZING AT ITS VERY BEST

VAPO SYSTEMS CO. 1931 So. Tenth Ave., Maywood, Ill.

Downingtown Mfg. Co.

Downingtown, Pa.

During the previous twelve months our company has been engaged in rebuilding a number of paper, felt and wallboard machines, adding vats, stainless steel stock distribution boxes, stainless steel mix boxes, stainless steel head boxes, press equipment, suction rolls, extractors, dryers, cutters, slitters, reels, drives, cylinder moulds, etc.

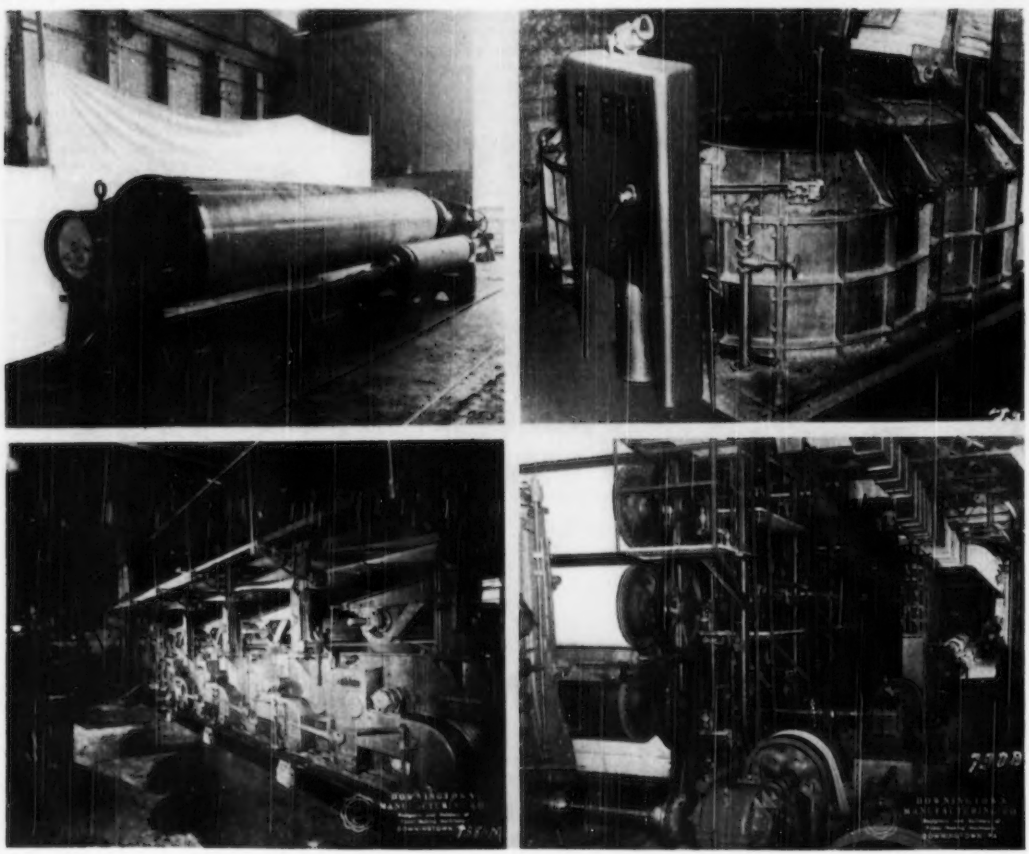
We have completed the installation and put into operation one three-width felt machine for the Ruberoid Co., Mobile, Ala.

A large number of our modern pro-flow and conflow vats have been put into operation during the past year. These include stainless steel vats, complete cast iron vats with bronze, monel or stainless steel circles, and wood body copper lined vats with cast iron ends. A special approach flow system designed for and producing excellent formation is part of all of these vats and has received an enthusiastic reception.

Our Wiener Fibrefiners have been redesigned for precision setting and to obtain a uniform and constant product, and are giving an excellent account for themselves.

We have designed a new line of gear units for continuous and heavy overload duty as required for the proper operation of paper machines under all operating conditions.

We have designed a complete line of pulpers and now have in operation a number of these for both batch and continuous pulping of mixed papers,

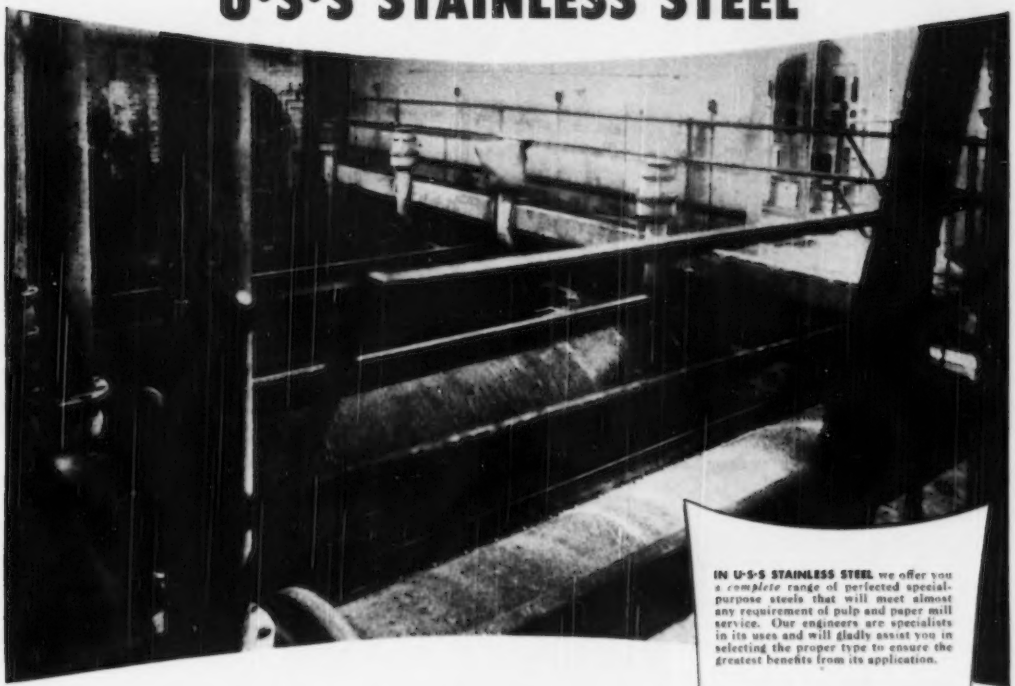


Upper Left—View of largest and smallest Suction Couch Rolls ever made by Downingtown. The large roll went to Finland through U. S. Wallboard Machinery Co. The smaller went to Crane Co., Dalton, Mass. Upper Right—Pulper at Personal Products, Milltown, N. J. Lower Left—All cast iron vats at Consolidated Paper Co., Monroe, Mich. Lower Right—Stack dryers and drives, Consolidated Paper Co., Monroe, Mich.

Wire cloth faces and winding wire *last longer*

WHEN THEY'RE MADE OF

U·S·S STAINLESS STEEL



THAT'S because Stainless Steel offers superior resistance to the corrosive action of pulps, paper mill stocks and white waters, caustic liquors and cleaning solutions.

Additional life-prolonging and cost-cutting qualities are Stainless Steel's rigidity—almost twice that of bronze—its high strength and its resistance to wear and abrasion.

When Stainless Steel cloth and wire are used in washers, thickeners, cylinder molds and filters, mills report *years* of service instead of months.

Wherever applied, U·S·S Stainless Steel, whether used in the form of plates, sheet, strip, wire or tubing, protects equipment against corrosive attack, protects the product against discoloration and metallic contamination.

Stainless is daily becoming more and more indispensable in pulp and paper mill operation for, as one prominent mill manager said recently, "Without Stainless Steel it would be impossible to produce paper at today's prices."

IN U·S·S STAINLESS STEEL we offer you a *complete* range of perfected special-purpose steels that will meet almost any requirement of pulp and paper mill service. Our engineers are specialists in its uses and will gladly assist you in selecting the proper type to ensure the greatest benefits from its application.

U·S·S STAINLESS STEEL WIRE is available in sizes ranging from ½" diameter to as fine as .005". In pickled, oil drawn, soap drawn, diamond drawn or bright annealed finish.

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COLUMBIA STEEL COMPANY, SAN FRANCISCO · NATIONAL TUBE COMPANY, PITTSBURGH · TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM

UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

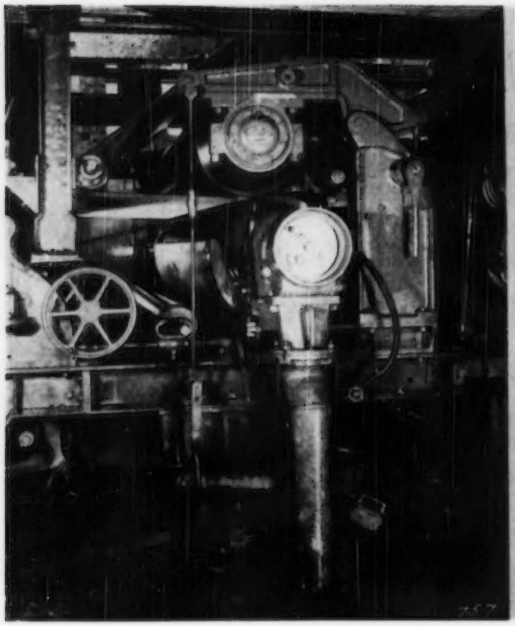
USS

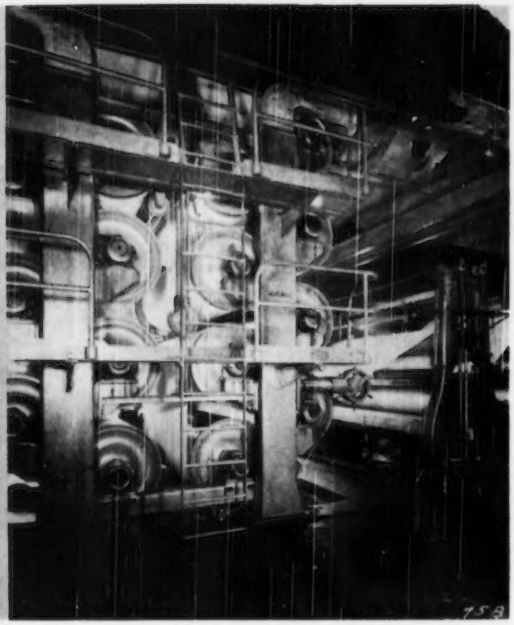
U·S·S STAINLESS STEEL

SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

0-959

UNITED STATES STEEL





At Left—Suction Press, Consolidated Paper Co., Monroe, Mich. At Right—Stock Dryers, No. 6 B Machine, Consolidated Paper Co., Monroe Mich.

news, kraft clippings, pulp, broke, etc.

A new line of "Mixrite" paper stock pumps has been developed to fit in with our stock preparation system. These pumps provide chest agitation as well as sending stock to the head boxes.

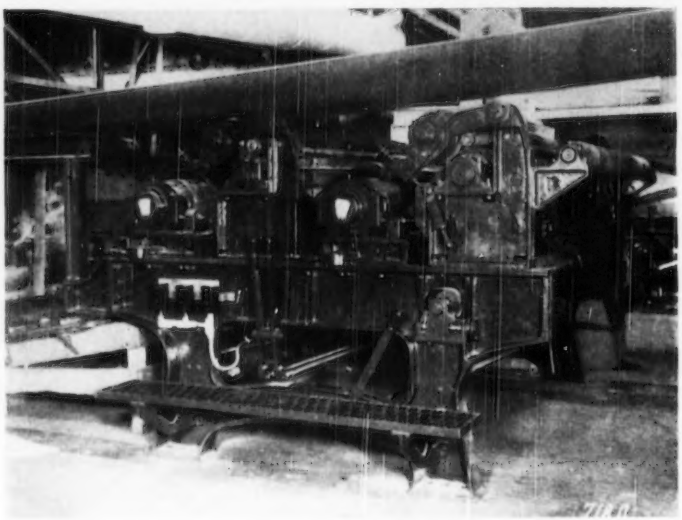
We are now building a new high speed, high efficiency precision duplex cutter and lay-boy for both finishing room and machine application. This will shortly be on exhibition on our factory floor and set-up to make trial runs on paper furnished by prospective customers. The new Downingtown Load Meter, for accurate setting and maintaining of nip pressures between the rolls of paper machine presses, has been successfully applied and a substantial number of the units are on order.

A pneumatic mandrel for winder and reels has been developed and is now being marketed. The air pressure holds the mandrel in contact with the cores and when the air is released the mandrel contracts and permits it to be easily withdrawn from the roll. It is not only easier to operate, but also is up to 50 percent lighter than previous collapsible shafts. It is self contained and does not require any rotating air hose connection.

We are at present building a complete cylinder machine for 150 tons capacity and a wallboard machine consisting of a forming table and press section for a wallboard plant.

Our non-deflecting press rolls are finding a good field and giving a good account for themselves.

Downingtown suction cylinder couch rolls have been in operation on a variety of machines for a good many years. This year, a rubber covered suction cylinder couch roll was developed and it is operating very satisfactorily; it promises to have a wide application to all types of cylinder machines.

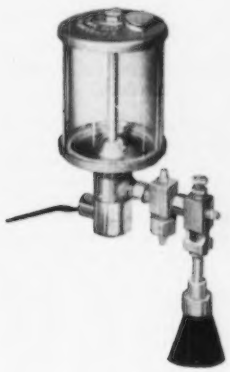


Cutter for Whippany Paper Board Co., Whippany, N. J.

Conveyor Chain Oiler

(Continued from page 159)

the chain runs. Dual brushes are available having a center distance of 3½" between brushes, and wider distances can be provided. Oil reservoirs



are available in sizes from 9 oz. to 1 gallon. Manually-operated oilers also can be furnished having a needle valve instead of a solenoid, and actuated by a toggle shut-off on top of oiler.

NEW PAPER USES

Sleeping Bag

A new type sleeping bag weighing a mere five and a half pounds is constructed of heavy 2-ply asphalt laminated kraft, lined with a total of three pounds of cotton batting. External seams are bound with heavy kraft crepe paper. An extra long 58 inch flap provides shelter for the user's personal effects. The bag is six and a half feet long and three feet wide and costs less than four dollars.

New Caustic Plant For India

NEW YORK—A new caustic soda and chlorine plant, constructed with American engineering "know how," has increased the production capacity of caustic soda in India almost 20 percent, it was disclosed by engineers who participated in the project.

The plant, now operating at capacity, was designed and built by The H. K. Ferguson Co., industrial engineers and builders, for Delhi Cloth & General Mills, Ltd., at Delhi.

Small by U. S. standards, the new plant has an annual capacity of 2100 tons of caustic soda, which represents a sizeable portion of India's estimated 12,000-ton output in 1950. The remainder of the 45,000 tons required annually in India is imported principally from the United Kingdom and the United States.

Your quickest, surest step to lowered production costs and increased profits is to eliminate excess handling of your raw materials and products . . . to change man-handling to **Mass-Handling** with Towmotor Fork Lift Trucks and Tractors. Reduce the costly man-hours spent transporting, lifting and stacking products within your plant . . . and your production payroll costs drop as much as 60%. Warehouse costs nosedive, too, because Towmotor uses every available inch of overhead storage space. Find out how YOU can cut your production costs . . . write TODAY for a copy of "Handling Materials Illustrated." Towmotor Corporation, Div. 17, 1226 East 152nd St., Cleveland 10, Ohio. Representatives in all Principal Cities in U. S. and Canada.

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*MH is *Mass Handling!*

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The Haug Kollermill

J. S. DOYLE

The Kollergang or Edge Runner, as it is sometimes called, is well known to paper makers for its ability to impart highly desirable characteristics to fibers in the paper manufacturing process. Using the principles of the Kollergang in a modern continuously operating machine the new Haug Kollermill has been engineered specifically for pulp and paper mill use. The new machine combines simplicity of operation with low maintenance cost, and a flexibility of control in varying the treatment of the fibers during operation which makes it readily adaptable to a variety of uses. Patents covering this machine are pending in the United States, Canada and foreign countries.

The Kollermill is the product of many years of research and experimentation. Prior to the construction of any commercial models a much smaller laboratory machine was built, and thoroughly tested in its applications to the widest possible variety of stock, and under as many and as varied conditions as possible. The results were satisfactory far beyond original expectations, and indicated the possibilities of application in the Pulp and Paper Industry. *Figure 1* shows a Kollermill designed for laboratory experimental use. The machine pictured is owned by the University of New Hampshire, and used in their Research Experimental Station primarily for work on semi-cooked chips. Experimentation at the University has demonstrated that the Kollermill, though primarily designed for installation in pulp mills, has wide applications in other types of manufacture, and in the treatment of other materials. In all test

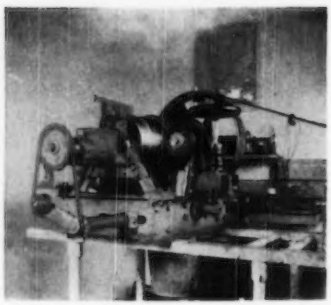


Figure 1

applications, the Kollermill has outstripped attrition mills and beaters both in quality of stock produced, and in economy of operation. It has produced stock identical in quality with that prepared by standard beaters, but at one tenth the power consumption. Additional savings in time of treatment were effected in each case.

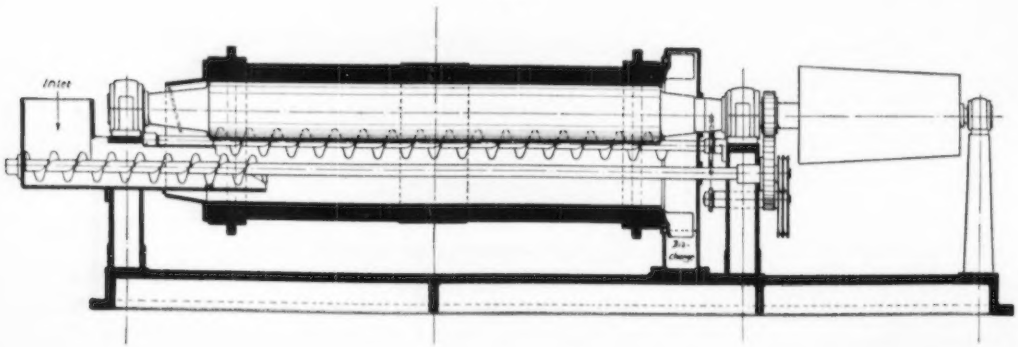
Since laboratory testing with small models is often a far cry from commercial operation with full sized equipment, a commercial model was next constructed to check earlier findings under conditions more closely approximating normal mill operation. The stock used was supplied in all cases from the regular runs of a number of large mills. Results were slightly better than those obtained with the small model, and showed additional savings, from low power consumption with better quality control than in the small model. The Kollermill was then considered ready for the market, and is now being produced in two types and sizes.

The essential mechanical features of the Kollermill are shown in *Figure 2*. Pulping action is achieved through the correlation of a roll, a rotating cylinder, and a conveyer. The roll rotates in standard antifriction bearings supported on stands at each end of the machine. Supported on the roll and rotating with it is the cylinder. Both cylinder and roll are individually driven and, if desired, the relative surface speed of the roll may be increased over that of the cylinder to impart a slight rolling motion to the fibers while they are being squeezed.

The material to be processed is fed into one end of the rapidly rotating cylinder. It is carried by centrifugal force up to the nip, which is very gradual due to the proportionately large size of the roll which is about one half the diameter of the cylinder bore. The material is squeezed in the upper section of the machine, and as it leaves the squeezing area it makes contact with the rotating conveyor for a fraction of a second. The conveyor, the speed of which is variable according to the application, turns the material over, pushes it forward a given distance directly proportionate to the conveyor speed, and drops it back into the rotating cylinder. The number of times this operation is repeated is controllable by increasing or reducing conveyor speed to vary the time factor for the treatment. The course which material in treatment takes through the machine is shown in *Figure 3*.

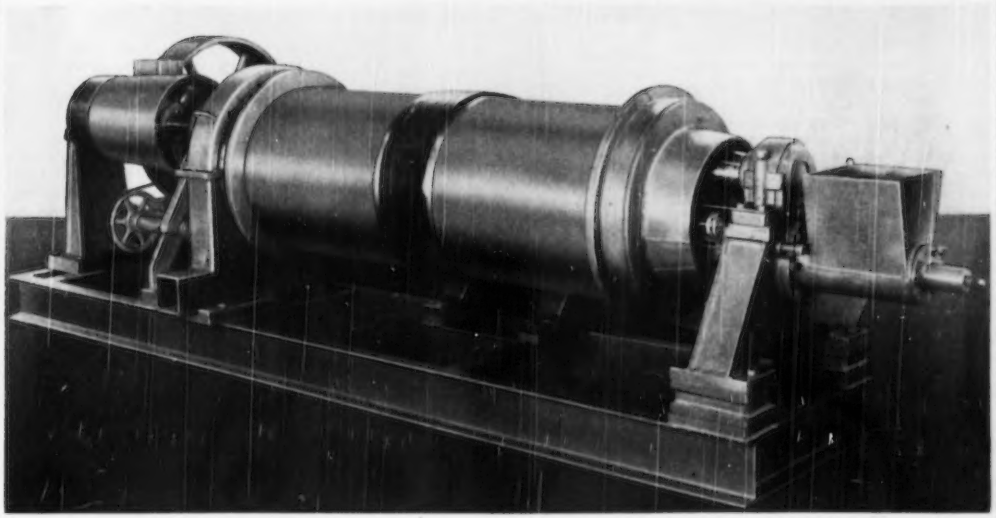
For general pulp mill work where a

Figure 2



New! NOW AFTER YEARS OF RESEARCH AND TESTING WE PROUDLY ANNOUNCE THE –

HAUG KOLLERMILL



DESIGNED FOR MUCH GREATER SAVINGS AND EFFICIENCY IN REFINING OPERATIONS

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minimum of control is necessary to accommodate to changing conditions or materials a definite weight is selected for the cylinder. Complete simplicity of operation is thus achieved. Controls for varying the treatment are —in such an installation—the consistency of the stock when fed, the rate of feed, and the rate of travel through the machine.

A special type of Kollermill providing wide pressure controls is shown in *Figure 4*. In this construction the pressure of cylinder against roll is adjustable from relatively light to very heavy. This type of machine is especially adaptable to work when the treatment of the material is to be varied within wide limits. The coordination which may thus be effected between the rotating conveyor and the two squeezing elements—roll and cylinder—produces an astonishingly effective pulping action directly variable according to the characteristics of the material to be treated and the product desired.

A study of the accompanying figures will illustrate better than can words the simplicity of construction and operation of the Haug Kollermill. Operation can be handled by inexperienced and unskilled help. The movement of the stock through the machine can be observed during operation. Regular maintenance is low, as may readily be judged by examination of the design and construction. Special maintenance which is made necessary through careless operation of so many other types of machines performing functions similar to those of the Kollermill is practically eliminated. The machine is not easily damaged through overloading or underloading, may be run empty for a considerable period without excessive wear to roll or cylinder, and is not damaged by the chance introduction of foreign substances such as bolts, chain links, or other bits of steel.

Kraft Knots, Sulphite Knots

Originally the purpose of this new design was to replace Hammermills for working up the knotter rejects in kraft and sulphite mills. The performance of the Kollermill on this type of waste was amazing. In one pass through the Kollermill the knots were opened up into fibers without the occurrence of chunky material seen in the discharge from hammermills and attrition mills on similar work. In one major company desiring to produce stock for mill wrappers from sulphite knots, a comparison between the Kollermill and a disc refiner showed the following results. The Kollermill produced from the knots, in one pass, stock that was ready for making wrapper. Power consumption was about five (5) HP/ton. The discharge from the disc refiner could not be accepted. It needed further treatment in a jordan before going to the wrapper machine. The original power consumed by the disc refiner was considerably higher than that used by the Kollermill, plus the additional power required by the jordan. At a lower rate of feed with the same stock the Kollermill produced in one pass pulp that was comparable to pulp passed through the attrition mill and jordan a number of times.

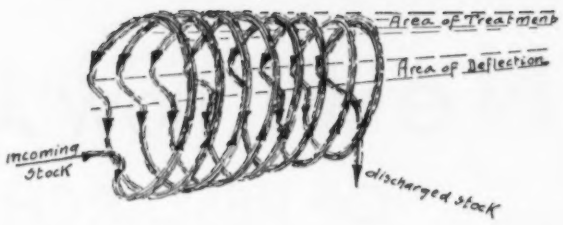


Figure 3

Silver Screen Waste

Operation with the rejects from ground wood coarse screens (sliver screens) is equally surprising. Many mills are presently using hammermills for this purpose. These produce needle-like slivers which are relatively thick with many short chunky pieces mixed in. The power consumption is very high, as is generally known. The discharge from the Kollermill is of an entirely different character. It is already semi-pulp with the slivers opened up lengthwise and in such a way that the fiber bundles separate from one another without being broken crosswise.*

Semi-cooked

The action of the Kollermill is ideally suited for pulping semi-cooked chips. Due to the repeated squeezing releasing and mixing motion, a pulp is produced that cannot be equalled by attrition mills. Here again the fiber bundles are separated in such a way that individual fibers are not broken or cut. The pulping process is accomplished quickly, and the resulting product has uniformly high tensile strength and good color.

Mixture of Sulphite Knots & Sulphite Screenings

One of the most amazing experiments performed with the Kollermill was conducted for a company producing fine tissue napkins. A mixture of sulphite knots and sulphite screenings, which had been accumulating over a long period as waste and for which there was no use in products presently being manufactured by the company, was treated in the Kollermill. This material, which had been considered nearly a total loss so far as any recovery value was concerned, was processed into a cream colored tissue comparable to certain other grades presently being produced in that mill. The material had required only one pass through the Kollermill.

There are a great number of other applications in which the Kollermill will prove superior to present equipment and processes. It is not the purpose of this article to cover the wide field of applications in which this machine can prove of great value. In future articles we shall discuss specific applications of the machine. It will be sufficient to make only that point in this article that while there may be nothing really new under the sun, the conversion of old and well known principles to modern practice makes for continued growth and progress. In such a way has our long interest in the principle of the Kollergang Edge Runner resulted in the production of a machine that has much to offer modern paper mills.

*This semi-stock so produced is better prepared for final refining than that from any other reducing machine and therefore, can be converted into a better refined stock at less power per ton than has ever been known.

Ammonia Substituted For Soda Ash

RICHMOND, Va. — Shortage of soda ash as a result of a chemical workers' strike is forcing Mead Corp.'s Heald division in Lynchburg to use ammonia as a substitute in an effort to continue its manufacture of paper board.

Leonard R. Growdon, supervisor of Mead mills, said he was reasonably certain that enough ammonia would be available to keep the plant running, although it has no chemicals contracted for or on hand to use as an alternate for soda ash after September 1.

A trial run, using ammonia, was made recently and proved successful, Mr. Growdon said. However, a small amount of resulting smoke escaped from the plant and caused some concern among near-by residents.

Sullivan Resigns From Gould

Edward J. Sullivan has resigned as Eastern sales manager of Gould Paper Co., a subsidiary of Continental Can Co., 100 East 42nd street, New York City, effective October 15. Mr. Sullivan was previously associated with Oxford Paper Co. and Fraser Paper Ltd.

Modern Electrical Equipment

(Continued from page 154)

One of the most popular systems for obtaining a drive for operation over a wide speed range is the d-c adjustable voltage drive. These adjustable voltage drives are available in packaged units from 1 to 200 hp. The packaged power supply unit requires only the connection of the incoming a-c line, the lines to the operator's control station, and the outgoing d-c supply lines, thus the cost of installation is greatly reduced. The a-c and d-c controls are included in the package as well as the motor-generator set and the excitation supply. The power supply unit can be used to supply a single d-c drive motor or several motors may be operated in parallel as on a sectionalized drive.

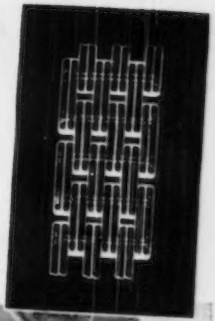
Many single motor drives continue to be supplied for powering paper and board forming machines, coaters, corrugators and laminators. These drives usually require speed regulation in order to hold the quality of product within allowable standards. The Rototrol rotating regulator (used in conjunction with d-c motors and adjustable voltage d-c generators) is the most popular type of speed regulator used for single motor drives although the electronic speed regulator has been used for many years and will probably see increased use in the future. In the Rototrol system, changes in line-shaft speed are detected by comparison of the speed measuring pilot generator output with the voltage across the speed adjusting rheostat. The difference of these two voltages is amplified in the Rototrol which compensates the excitation of the main d-c generator and automatically corrects the generator voltage to maintain the motor speed constant at any speed over the entire operating range. The speed cue circuits are arranged to be automatically temperature compensating, thus eliminating the necessity of a regulated reference source. Electric single motor paper machine drives can be built in sizes ranging up to 2000 hp.

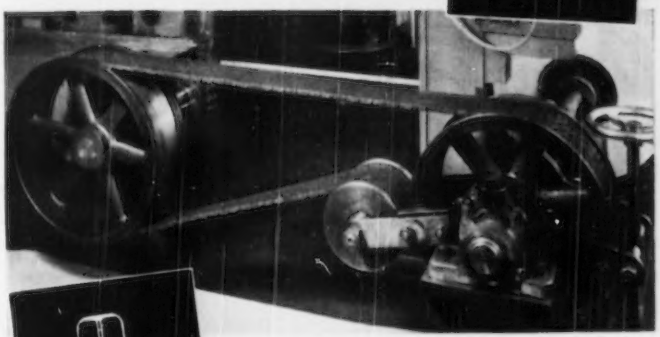
There are some mills in which an economic use of direct drive steam turbine for the paper machine can be made. These turbines quite often operate at steam pressures up to 850 psi and temperature of 750°F. over a 10 to 1 speed range and they range in size from 100 hp to 2000 hp. Since the turbine is a high speed prime mover, it is operated into a speed reducer which may be belted or direct coupled to the line shaft. Accurate governors are provided to insure good speed regulation over the operating range.

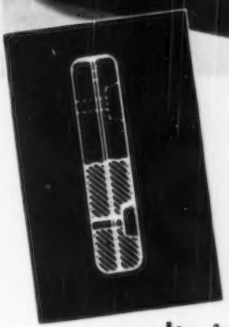
The general trend is toward applying motors to the individual sections of pulp drying machines, paper machines, board machines, corrugators, cutters and laminators. The sectional drives eliminate the complications of lineshaft, clutches, belts and other space consuming rig. The amount of power that can be put into a given

(Continued on page 168)

Alexander DUPLEX Leather LINK BELT







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results in Greater Efficiency and Durability in Heavy Paper Mill Drives

For winder drives, or any drive where the pull is slow and heavy and slippage is required, ALEXANDER DUPLEX Link Belt offers many outstanding advantages. "Double-Ply" construction provides a stronger link that wears evenly, with less chance of stretch or breakage. DUPLEX has extreme flexibility, permitting efficient operation on small pulleys with relatively short centers. It possesses great tensile strength, resists heat caused by slippage and provides maximum belt life. Get the complete details.

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section is almost limitless with the sectional arrangement. The modern sectional drive provides full automatic control for each section and accurate speed synchronization between sections over an operating range frequently as great as 10 to 1.

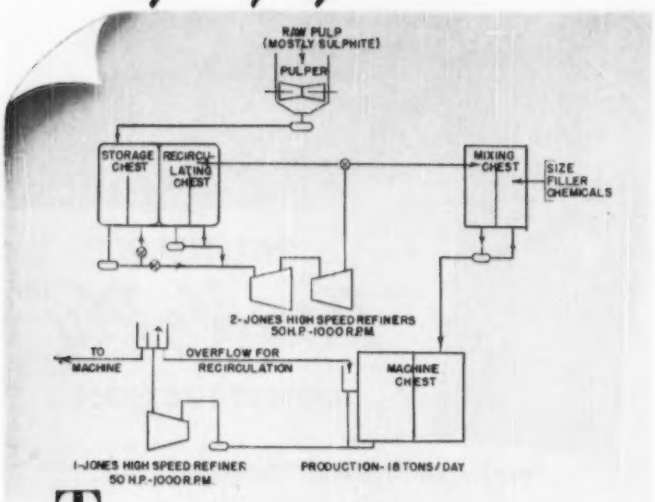
The sectional paper machine drive is not new; it has been a continuing development for the past 40 years. More recent developments in the sectional electric drive have included the electronic speed regulators. These speed regulators have an infinite number of regulating points with no moving or wearing parts and provide increased sensitivity and stability with a broad control range. The modern sectional electric drive may include a power set with a single main d-c generator for supplying power to the section motors, or it may include individual generators for each independent section of the machine. With the single generator, the section speed regulators are arranged to control the section speed by control of the excitation of the individual section motors. On the other hand, with the multiple generator system, the regulators control section speed through the control of the excitation of the individual generators. Such features as full automatic control, preset speed adjustment, "finger tip" draw adjustment, current limit acceleration of individual machine sections, sheet tension control, and dynamic braking are available with the modern sectional electric drive. The use of a-c tachometer generators of the inductor type having both the d-c excitation winding and the a-c armature winding in the stationary member eliminates inaccuracies due to contact surface film changes and results in an extremely accurate speed cue.

Helper drives are being economically applied to both cylinder and Fourdrinier machines. It is frequently desirable to provide more than one point for applying power to the forming felt or wire of these machines to supplement belt capacity, to obtain a better sheet and to reduce felt or wire wear. With the modern form of auxiliary wet end drive, direct current motors and gear units similar to those used on sectional paper machine drives are used to power the auxiliary rolls. On machines equipped with sectional drives the power for the auxiliaries may be obtained from the mill a-c supply by the use of motor-generator sets. On line shaft driven machines the power may be obtained in a similar way or by the use of a d-c generator driven from the lineshaft. In either event, Rototrol torque regulators are supplied to insure that the driving effort of the helper motor or motors is held quite constant as adjusted by the machine operator regardless of the machine operating speed. The control is arranged to automatically apply power to the auxiliaries when the main sections are started.

Electronics are playing an increasingly active part not only on sectional drive speed regulators but also on such devices as break indicators, draw indicators, register regulators, and air cleaners. Almost every modern paper machine has a photoelectric break indicator preceding the dryer section to quickly warn the machine tenders that a break has occurred. Draw indicators are proving themselves useful to show the speed difference between adjacent sections so that the operator can make speed adjustments before excess draw variation occurs. Register regulators for side register control and for cutting to length are making possible faster printing, cutting and rewind processes. Precipitron electrostatic air cleaners are proving themselves valuable for removing air-borne particles from working areas, motor and control rooms and forced air supplies.

The modern supercalender is truly an automatic machine. Provision is made to electrically pay out the paper from the unwind stand to the calender. After the paper is threaded through the calender at a threading speed of 40 to 50 feet per minute the roll pressure can be applied and a wrap on the electrically driven wind core made. The drive can be accelerated, with roll pressure on, to the desired oper-

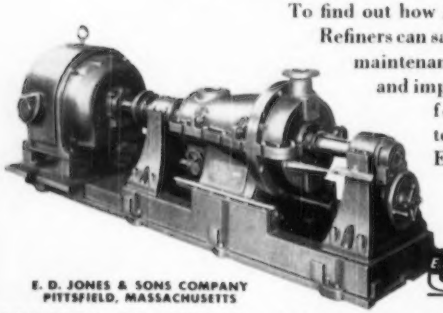
"... completely replaced 10 beaters"



The *flow-chart* above illustrates how a well-known mill in France is using 3 JONES HIGH-SPEED REFINERS in preparation of all their stock. Production at this mill is 18 tons per day of printing and bond papers . . . which figures out to 200 horsepower hours per ton for refining.

This installation is saving 20% in power — and 15 man-hours per day — and giving complete satisfaction.

To find out how Jones High-Speed Refiners can save on power, keep maintenance to a minimum and improve stock control for you, write us today for Bulletin EDJ-1011A.



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E.D. Jones

BUILDERS OF QUALITY STOCK PREPARATION MACHINERY

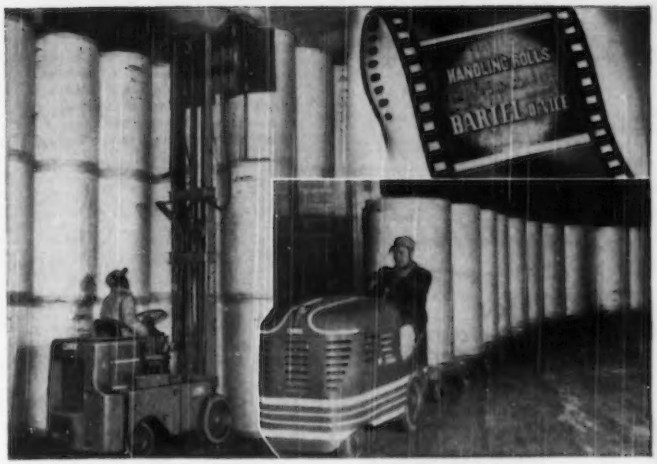
ating speed which may be as high as 2000 feet per minute. Inertia compensation for the reels is provided to hold tension during the speed changing periods. Thus the paper supercalendered during accelerating or decelerating periods need not be wasted.

The range between threading speed and maximum productive speed is very wide. At threading speed the main d-c generator is operated practically at residual voltage and the resistance drop in the armature circuit of the d-c equipment is a large part of the total voltage at threading speed. Consequently, variations in load produce variations in threading speed. A Rototrol threading speed regulator is arranged to compensate the excitation of the main generator to maintain essentially constant speed regardless of changes in load. A uniform threading speed whether the roll pressure is on or off assures maximum safety of operators, reliability and economy of operation.

Boosters are provided in the armature circuits of the unwind generator and the wind motor. These boosters provide power to inch the reels as well as IR drop compensation, inertia compensation and (on the wind) tapered tension if required. Tension regulating Rototrols function with the boosters to maintain essentially constant tension as adjusted by the operator on the unwind and the wind reels during speed changes as well as at operating speeds. Tapered tension may be provided on the wind reel to cause the tension to automatically be tighter at empty core than at full reel and to cause the tension variation to be linear. The feature of tapered tension has been found desirable in winding soft and uniform rolls.

Magnetic amplifiers, which proved so valuable in servo-equipments during World War II, are being used increasingly in regulating circuits. This static self-saturating device will be well received by the paper industry because it is permanent and maintenance free. The magnetic amplifier is a high gain device making use of saturable reactors having both a-c and d-c windings and dry type rectifiers. Only limited use of the magnetic amplifier is being made at present. Increased use is expected as experience is gained in the design and application of this apparatus. The magnetic amplifier is well suited to regulate speed, torque and tension for many drives in the paper industry.

This article outlines some of the recent practices and trends in Electrical Equipment for the Paper Industry. The efforts of the electrical manufacturers are constantly directed toward keeping pace with the requirements of the paper industry by producing equipment to increase production, improve quality, reduce costs, and please the operating personnel. The electrical manufacturers are proud to have had a part in recent improvements of paper mill products and processes.



CLARK in the PAPER Industry

A SURE-FIRE WAY TO GET MORE FOR YOUR MONEY—CLARK FORK TRUCKS

✓**More Efficiency**
(DO MORE JOBS BETTER)

✓**More Economy**
(COST LESS TO OPERATE)

✓**More Durability**
(LAST LONGER)

CLARK products are released only after standing the exacting test of Clark's Unmatched Engineering Laboratory.

Lower your break-even point—by cutting those handling costs with the versatile, efficient, and economical Clark Machines

Many practical handling attachments broaden the usefulness of Clark fork trucks—good idea to know about them

To borrow the new movie—"Handling Rolls with the Bartel Device" fill in coupon, attach it to your business letterhead and mail to CLARK

THREE MORE REASONS WHY CLARK IS YOUR BEST BUY

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS AND INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIVISION • CLARK EQUIPMENT COMPANY • BATTLE CREEK 58, MICH.

We would like to make arrangements to borrow the movie "Handling Rolls with the Bartel Device."

NAME_____

FIRM NAME_____

STREET_____

CITY_____ ZONE_____ STATE_____

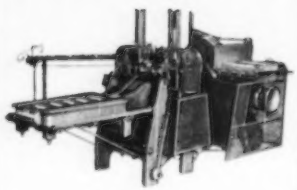
AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

New Corrugated Box Plant

GENEVA, Ill.—The Fox Valley Box Co. is constructing a new corrugated paper box plant near St. Charles, Ill. It will be a one-story building and will contain 17,000 square feet of floor space.

Lawtomatic

SEALING for AUTOMATIC SELLING



This Lawtomatic
End Sealing Machine is a honey
Its simple
Design will make you money
The cost
Is definitely a secondary issue
Because
It beautifies your Toilet Tissue
Here's another howl
It can do the same for
Your Kitchen Towel

The C. A. LAWTON COMPANY
Dept. PT DePere, Wis.

THE ACCEPTED STANDARD BRUSHES

Industrial BRUSHES

For All Paper Needs

Gus Riedel and Son
Manufacturers
KALAMAZOO, MICH.

THE H. K. FERGUSON COMPANY
PAPER MILL ENGINEERS & BUILDERS

Complete Service for Design, Construction, Equipment Installation, Engineering Reports and Surveys

Executive Offices
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District Offices
19 Rector St., New York. M & M Bldg., Houston. 120 S. La Salle St., Chicago. 2975 San Fernando Road, Los Angeles. 21 E. 12th St., Cincinnati

PRICES

The prices below reflect general market quotations at the mill level on the standard grades in which the normal volume of business is being done. Does not include occasional spot offerings.

NEW YORK
Delivered Ports

Standard News, per ton—

Rolls, contract	$100.00/	—
Sheets	115.00/	—

F.o.b. Mills. Carload freight allowed, dock N. Y.

Kraft— per cwt., 40# base wgt.

Standard Wrapping Rolls	$6.75/	$7.00
No. 1 Wrapping Rolls	7.50/	8.00
Standard Bag	6.50/	6.75

Tissues—per ream 24x36 (480) 10 lbs. 2500 lbs. or more

Wh. No. 1 Frd	$1.60	$1.65
Wh. No. 1 MG		
Wh. No. 1½		
Wh. No. 2	1.45	—
Kraft Non-Tar		
White Non-Tar		

Toilet— per case of 100 rolls—1 M sheets.

Unbleached 4½x4½	$5.90/	—
Unbleached 4½x5	5.85/	—
Bleached 4½x4½	7.10/	—
Bleached 4½x5	8.80/	—
Per Case of 50 rolls—2000 sheets		
Unbleached 4½x4½	$5.90/	—
Bleached 4½x4½	6.95/	—
Per Case of 100 rolls—1000 sheets		
Facial, 4½ x 5, 2 ply	$8.95/	$9.45

Paper Towels—per case of 3750.

Wh. Jr. M'tif'd 9½x9½	$5.25	
Br. Sr. M'tif'l 10x12	3.60	
Br. Jr. M'tif'd 9½x9¾	3.10	
Br. Jr. Sgl. fold 10x10¾	3.15	
Blchd. 7½ x 11, 24/25 rolls	$3.95/	$6.25

Manila, per cwt.

No. 1 Jute Tag sheets*	$15.55/	$17.55
Reg. Jute M.F. 40-lb., sheets*	14.00/	16.00
Wrapping Manila	8.75/	10.50
Printing Manila	10.00/	11.00

* Less usual allowance for rolls.

Gummed Tape—per bdl., 500 bdls. or more.

90-lb. 375 ft. GSI	$5.70/	—
60-lb. 600 ft. GSI	5.70/	—
35-lb. 800 ft. GSI	6.54/	—
35-lb. 500 ft. GSO	4.89/	—

Boards, per ton—

Filled News	‡	$87.50/$92.50
Plain Chip	‡	85.00/ 90.00

WORLD WOOD PULP MARKETS
Third Quarter Contract Price, Per Short Air-Dry Ton
Delivered, with varying freight allowance

	U. S.	Canadian	On dock Atlantic Ports: Swedish	Finnish	Norwegian
Groundwood	$65.00/ 70.00	$70.00/ —			
Sideruns Pulping News	$65.00/ 66.50	65.00/ 66.00			
Soda, Bleached	120.00/122.00	122.00/ —			
Sulphate, Bleached	122.00/143.00	131.00/ —	*130.00/137.00†		*129.00/ —
Sulphate, Unbl'd North'n		95.00/105.00	*90.00/ 97.50†		
Sulphate, Unbl'd South'n	90.00/ 95.00			* In	
Sulphite Blchd. (S'ftw'd)	122.00/125.00	125.00/ —	*125.00/128.00†	Competitive	Competitive
Sulphite, Blchd. (H'dw'd)	120.00/ —			range	
Sulfite, Semi-blchd.	112.00/ —				
Sulphite, Unbleached		107.00/ —	107.00/110.00†		
Sulphite, Unbl'd (Glassine)		110.00/ —	111.00/ — †		

* On dock. † Delivered.

WASTE PAPER MARKET

The following quotations were gathered from major dealers in each market. They are an indication of the price range in which volume tonnage was moving on the date specified. Spot offerings or special packings are not necessarily included. Prices to mills, per ton, f.o.b. cars shipping point (includes brokers' fee.) ALL PRICES NOMINAL.

	New York	Philadelphia	Boston	Chicago
	Sept. 5	Aug. 30	Sept. 1	Aug. 18
No. 1 Mixed Paper	$16.00/ 18.00	$20.00/ —	$16.00/ 17.00	$17.00/ —
Boxboard Cuts	14.00/ 20.00	14.00/ 18.00	14.00/ 16.00	21.00/ —
Mill Wrappers	20.00/ 29.00	25.00/ 30.00	17.00/ —	19.00/ —
No. 1 News	23.00/ 24.00	21.00/ 23.00	21.00/ 22.00	25.00/ —
Over-issue News	25.00/ —	24.00/ 28.00	17.00/ 20.00	28.00/ —
Corrugated Containers	33.00/ 35.00	32.00/ 36.00	32.00/ 35.00	35.00/ —
New Corrugated Cuts	28.00/ 40.00	35.00/ 40.00	35.00/ 40.00	40.00/ —
Double Kraft Ld. Corr. Cuts	60.00/ —	55.00/ 58.00	45.00/ 60.00	60.00/ *
Used Kraft Bags	42.50/ —	55.00/ 58.00	40.00/ —	00/ —
No. 1 Brown Kraft Paper	42.50/ —	45.00/ 50.00	45.00/ —	40.00/ —
Super Resorted Br. Kraft	55.00/ —	55.00/ 60.00	50.00/ 60.00	50.00/ —
New Br. Kraft Env. Cuts	95.00/100.00	80.00/ 90.00	85.00/100.00	75.00/ —
New Br. Kraft Cuts	58.00/ 65.00	75.00/ 80.00	60.00/ 75.00	70.00/ —
No. 1 Gdwd Shvs.	40.00/ 45.00	35.00/ 45.00	40.00/ —	35.00/ —
White Newsblanks	70.00/ —	60.00/ 65.00	55.00/ 65.00	50.00/ —
No. 1 Flyleaf Shvs.	55.00/ —	45.00/ 50.00	50.00/ —	50.00/ —
No. 1 Soft Wht. Shvs.	100.00/115.00	110.00/120.00	90.00/105.00	90.00/ —
Super Soft Wht. Shvs.	125.00/127.00	120.00/130.00	100.00/115.00	100.00/ —
Hd. Wht. Shvs.	120.00/130.00	130.00/140.00	120.00/135.00	115.00/ —
Hd. Wht. Env. Cuts	140.00/150.00	140.00/165.00	140.00/150.00	125.00/ —
New Manila Env. Cuts	80.00/ 90.00	80.00/ 90.00	80.00/ 90.00	70.00/ —
Col. Tab Cards	55.00/ —	55.00/ 65.00	50.00/ 55.00	45.00/ —
Manila Tab Cards	85.00/ —	95.00/120.00	90.00/100.00	85.00/ —
No. 1 Mixed Ledger	55.00/ 60.00	50.00/ 55.00	45.00/ 55.00	45.00/ —
White Ledger	70.00/ 75.00	70.00/ 75.00	65.00/ 75.00	60.00/ —
Mixed Books & Mags.	20.00/ —	30.00/ 35.00	25.00/ 30.00	20.00/ —
No. 1 Rep'd Hvy. Books & Mags.	35.00/ —	40.00/ 45.00	40.00/ —	33.00/ —

* f.o.b. or delivered.

Bldhd. Mla. L.d. Chip	‡ 112.00/115.00
White Pat. coated .020	‡ 130.00/135.00
Kraft Liners 42 lb.	105.00/ —
Kraft Corr. .009	110.00/ —
Binders Boards	120.00/124.00

The following prices are representative distributors' resale prices:

Rag Content Bonds and Ledgers—White, 20 lb.

Bonds	4 Ctns.
	per cwt.
100% Rag Ex. No. 1	$57.55/$59.45
100% Rag	50.65/ —
75% Rag	39.20/ 39.30
50% Rag	32.35/ —
25% Rag	27.70/ —

Ledgers	4 Ctns.
	per cwt.
100% Rag Ex. No. 1	$60.15/ —
100% Rag	51.90/ —
75% Rag	40.45/ 40.55
50% Rag	32.35/ 33.65
25% Rag	29.00/ —

Sulphite Bonds and Ledgers White, 20 lb.

Bonds	4 Ctns.
	per cwt.
Watermarked	$18.15/$19.00
Plain	17.10/ 17.45

Ledgers	4 Ctns.
	per cwt.
Watermarked	$20.15/$20.30
Plain	18.55/ 18.75

White Book

Conversion Coated	Case
	per cwt.
No. 1	$21.65/$21.75
No. 2	20.15/ 20.40
No. 3	19.65/ —
Machine Coated	
No. 1	$16.30/ 17.15
No. 2	14.90/ 15.15
Unrated	
No. 1 Antique (Watermarked)	$17.15/ 18.65
Offset	16.15/ 16.90
A Grade E. F.	16.15/ —
A Grade S. C.	16.65/ 16.90
B Grade E. F.	15.40/ —
B Grade S. C.	16.15/ —

‡ Indicates a price change.

Rag Market

New Domestic Cotton Cuttings
(Prices to Dealers, F.o.b. Ship. Pt.)
ALL PRICES NOMINAL

White Shirt	$14.00/$14.50
Unbleached Muslin	14.00/ 14.50
Light Silesias	8.00/ 9.00
White Black Blue Overalls	9.00/ 10.00
Blue Overalls	5.00/ 5.25
Fancy Shirt	5.00/ 5.50
Percales	6.50/ 7.50
Light Prints	6.00/ 6.75
No. 1 Washables	3.50/ 3.75
Bleachable Khaki	8.00/ —
Unbleachable Khaki	5.00/ —
Cottonades	4.25/ 4.75
Lt. Flannelettes	8.50/ —
Men's Corduroy	3.75/ 4.25
Women's Corduroy	4.00/ 4.25
Canton Flannels, Bldhd.	12.00/ —
Underwear Cutters, Bldhd.	13.50/ 14.00
Underwear Cutters, Unbldhd.	13.00/ 13.50

Old Domestic Cotton Rags
(Prices to Dealers, F.o.b. Ship. Pt.)
ALL PRICES NOMINAL

	Per 100 lb.
Mixed White	$3.25/ $4.50
Cotton Pants & Overalls	3.25/ 4.00
Thirds and Blues, Repacked	3.00/ 3.25
No. 1 Roofing Rags	1.65/ 1.75
No. 2 Roofing Rags	1.45/ 1.55
No. 3 & 4 Roofing Rags	1.35/ 1.45
Roofing Bagging	1.35/ 1.45

New Foreign Cotton Cuttings
(Prices to Mills, F.o.b. Dock, N. Y.)

	Per 100 lb.
New Dark Cuttings	$3.25/ $3.50
New Mixed Cuttings	3.50/ 3.75
Light Silesias	7.00/ 7.50
Light Flannelettes	7.00/ 7.50
New White Cuttings	nominal
New Unbleached Cuttings	nominal
Fancy Shirt Cuttings	5.50/ 6.00
Light Prints	6.00/ 6.50
Bleachable Khaki, No. 1	4.75/ 5.00
Unbl. Khaki, No. 1	4.00/ 4.25

Old Foreign Rags
(Prices to Mills, F.o.b. Dock, N. Y.)

	Per 100 lbs.
No. 1 White Cottons	$6.50/ $7.00
No. 2 White Cottons	5.50/ 6.00
No. 3 White Cottons	3.50/ 4.00
No. 4 White Cottons	3.00/ 3.50
Extra Light Prints	4.50/ 5.00
Old Light Prints	4.00/ 4.25
Med. Light Prints	2.75/ 3.00
Dutch Blue Cottons	3.25/ 3.50
Checks and Blue	2.75/ 3.00
Linsey Garments	2.10/ 2.40
Dark Cottons, European	2.00/ 2.25
Dark Cottons, Egyptian	1.85/ 1.95
Old Shopperies	1.75/ 1.85
New Shopperies	2.00/ 2.25

Bagging
(Prices to Dealers, f.o.b. N. Y.)

	Per 100 lbs.
Foreign Gunny	$5.75/ $6.00
Domestic Gunny, No. 1	5.50/ 6.00
Heavy Wool Tares	5.25/ 5.75
Foreign Manila Rope	5.25/ 5.50
Domestic Manila Rope	5.25/ 5.50
Jute Strings	5.50/ 5.75
No. 1 Sisal Strings	3.00/ 4.00
Mixed Strings	Nominal
Paper Mill Tares	3.00/ 3.50
No. 1 Scrap Burlap	
Foreign	4.00/ 4.25
Domestic	4.50/ 4.75
Austr. Wool Pouches	5.50/ 6.00
New Burlap Cuttings	5.50/ 6.00

MATERIALS

Aluminum, sulfate:	
coml. bags, wks.	cwt. 1.50
iron-free	2.75

MERRITT-CHAPMAN & SCOTT • MERRITT-CHAPMAN & SCOTT • MERRITT-CHAPMAN & SCOTT • MERRITT-CHAPMAN & SCOTT • MERRITT-CHAPMAN & SCOTT • MERRITT-CHAPMAN & SCOTT •

For the building of modern paper mills, Merritt-Chapman & Scott is uniquely equipped with specialist skills. During the past 10 years, we have built new plants or additions for the following 12 clients:

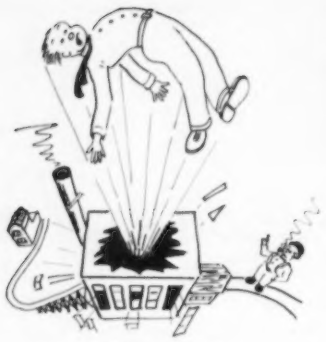
Union Bag & Paper Corporation . . . . . **Savannah, Georgia**
Container Corporation of America . . . . . **Fernandina, Florida**
National Container Corporation . . . . . **Jacksonville, Florida**
Southland Paper Mills, Inc. . . . . . **Lufkin, Texas**
Champion Paper & Fibre Company . . . . . **Pasadena, Texas**
Bedford Pulp & Paper Company, Inc. . . . . . **Big Island, Virginia**
Hudson Pulp & Paper Company . . . . . **Palatka, Florida**
B.F.D. Company . . . . . **Ogdensburg and Plattsburg, New York**
Dexter Sulphite Pulp & Paper Company . . . . . **Dexter, New York**
Alabama Pulp & Paper Company (St. Regis Paper Co.) **Cantonment, Florida**
St. Joe Paper Company . . . . . **Port St. Joe, Florida**
Camp Manufacturing Company . . . . . **Franklin, Virginia**

MERRITT-CHAPMAN & SCOTT
CORPORATION

Founded in 1860 . . . now in our 90th year

GENERAL OFFICES
17 Battery Place, New York 4, N.Y.

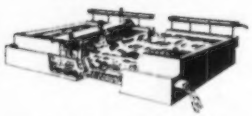
CLEVELAND • BOSTON • NEW LONDON • PASADENA, TEXAS



"Next time use HARDINGE process equipment for water supply or 'white water.'"

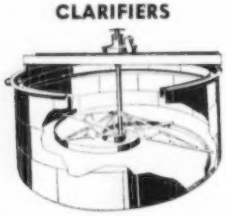
Possibly your process is not as delicately balanced as that of the gentleman above. However, Hardinge equipment for treatment of supply water or "white water" can increase your plant efficiency—save you money.

AUTOMATIC BACKWASH SAND FILTERS



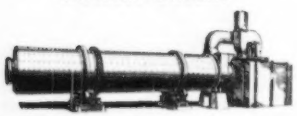
For removal of suspended solids. Self-cleaning. No shut-down during backwashing. 90% efficient. Write for Bulletin 46-14.

CLARIFIERS



For removal of settleable solids, recovery of fiber and filler from "white water." Steel or concrete tanks. Circular or rectangular. Bulletin 35-C-14.

BARK AND WOOD CHIP ROTARY DRYERS



The Ruggles-Coles "XA" or "XC" Indirect Heat Dryer is ideal for moisture removal from wood chips, bark, match splints, etc. Bulletin 16-D-14.

HARDINGE

COMPANY INCORPORATED

YORK, PENNSYLVANIA — 240 Arch St. • Main Office and Works
NEW YORK 17—122 E. 42nd St. • 205 W. Wacker Drive—CHICAGO 6
SAN FRANCISCO 11—24 California St. • 200 Bay St.—TORONTO 1

Alcohol, ethyl:
tax free, dms. c.l. ..... gal. .57 / .87
dedl. East Miss.

Casein, acid-prec.:
dom. sh. pt. c.l. ..... lb. .33 / .41½
imp. ex dock ..... lb. .34½ / .35

Caustic soda:
c.l. wks. solid, 76%, cwt. 3.20
flak. & grd. 100-lb. drums 3.60
liquid 50% tanks 2.40
liquid 70% tanks 2.50

China clay:
dom. air-float, filler, c.l. wks. ton 10.00
water washed 11.00
coating ..... 16.00 / 30.00
imported, ex whse., short ton 15.20 / 28.35

Chlorine:
single-unit tanks, works, cwt. 2.55
multi-unit ..... cwt. 3.05 / 4.25

Formaldehyde:
USP, inh. dms. c.l. wks. .... lb. .0570
l.c.l. E. wks. ..... .0620

Fuel oil:
Bunker C, No. 6 Cal. hvy
tanks, refinery ..... bbl. 1.25 / 1.55
light ..... bbl. 1.65 / 2.10

Hydrogen peroxide:
USP, 35% cbys. E. of Miss.
lb. .23½

Lime:
hydrated, bags, wks. Buffalo ton 13.50

Rosin:
B gum, drms., c.l. Savan. cwt. 4.10
G, H, I, K, do. ..... cwt. 6.50
FF wood, do. ..... cwt. 5.00

Rosin size:
70%, gum & pale grds, tank
cars, south, sh. pt. ..... cwt. 5.35 / 5.75

Salt cake:
dom. bulk, c.l. contract def'd ton 18.00 / 20.00
wks. frt. all. ..... ton 22.00 / —

Soda ash:
light, 58%, bags, wks. .... cwt. 1.35
bulk ..... cwt. 1.10

Sodium silicate 40°:
turbid, c.l. wks. ..... cwt. 1.10
l.c.l. wks. ..... 1.30 / 1.40

Sodium peroxide:
dms. c.l. E. of Miss. ..... lb. .18
l.c.l. do ..... lb. .18½ / .19

Soybean, protein:
chem. tsol. wks. c.l. ..... lb. .24 / —
Cinn. and Chic.

Sulfuric acid:
60° Be. cbys. c.l. ..... cwt. 1.40
E. wks.
l.c.l. ..... cwt. 1.80 / 2.50

Sulfur:
crude, c.l. mines, contract,
long ton 18.00
f.o.b. vessels Gulf.. ..... 19.50
Export, f.o.b. Gulf 22.00

Sulfur dioxide:
liquid, coml. cyl. wks. .... lb. .09
multi-unit cars ..... lb. .0535

Starches:
pearl corn, bags, c.l. Chic. cwt. 5.42 / —
white dextrines, c.l. Chic. cwt. 6.69 / —
potato, Idaho, c.l. wks. .... cwt. 5.25 / —
potato, Maine, c.l. wks. .... cwt. 5.25 / —
tapioca, conv. dextrines .. cwt. 6.75 / 7.25
medium grds. Gulf and East
Coast ports ..... 5.50 / 6.25
low, Siam, on dock N. Y. .... 4.75 / 5.25

Talc:
domestic, 50-lb. sacks, c.l.
wks. ..... ton 23.00 / 28.00

Titanium dioxide:
anastase, c.l. deld., bags .. lb. .19½
l.c.l. deld. ..... lb. .20
rutile, c.l. deld. .. .. lb. .21½
l.c.l. deld. ..... lb. .22½

N.B.: For special market conditions, see *Trends*.

U. S. IMPORTS WOODPULP

Preliminary, July, 1950

Item	Country of Origin	Short Tons
Mechanical		
Unbldd.	Canada	18,224
	Sweden	276
	Finland	720
		19,220
Screenings	Canada	382
Bldd.	Canada	929
Chemical		
Sulfite, Unbldd. ..	Canada	31,981
	Sweden	6,676
	Austria	131
	Czechoslovakia ..	235
	Finland	3,995
		43,018
Screenings	Canada	270
	Sweden	392
		662
Sulfite, Bldd:	Canada	20,670
Rayon & Special	Sweden	188
Chem. Grades ..	Austria*	118
		20,976
Other	Canada	19,449
	Sweden	4,163
	Norway	635
	Austria	261
	Czechoslovakia ..	**
	Finland	1,538
		26,046
Sulfate, Unbldd. ..	Canada	15,526
	Sweden	9,007
	Norway	56
	Finland	9,741
		34,330
Sulfate, Bldd. ..	Canada	25,586
	Sweden	3,893
		29,479
Soda, Unbldd. & Bldd	Canada	2,707
Totals, July	Canada	135,724
	Sweden	24,595
	Finland	15,994
	Norway	691
	Austin	510
	Czechoslovakia ..	235
		177,749

* To be investigated by B.O.C.
** Less than ½ ton.

Canada Tests Fire Plow

LANSING, Mich. — A Conservation Department-developed fire plow, capable of cutting a six-foot fire line as fast as a tractor will maneuver, has been loaned to Ontario for test work on Canadian forest fires, it was announced August 25.

New Bagley & Sewall Divisions

During the past year two new divisions have been created at Bagley & Sewall Co. These are the Winder Division and the Suction Roll Division.

Winder Division

The Winder Division is devoted entirely to the slitting, winding and converting equipment needs of the paper and board mills, textile and rubber mills, converters and allied industries. Several models are now in production in the shop and will be in operation in many plants throughout the country before the end of the year.

The objective of this division is to provide the industry with modern machines which will enable them to efficiently produce maximum quality rolls, stripping and allied converted products.

Suction Roll Division

The use of suction rolls on various sections of the modern paper machine has become increasingly important in the last few years, as machine speeds have become higher and higher.

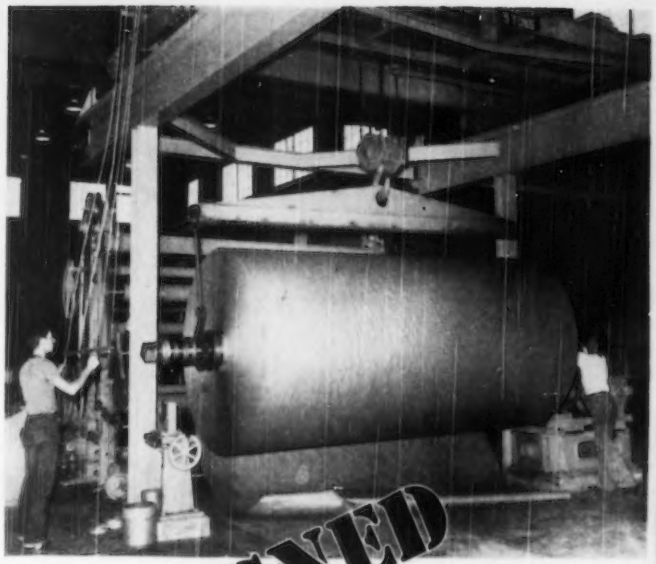
Up until this last year, Bagley & Sewall has acted as the middle man in the purchase and sale of these rolls on their customers' machines. This has proven an interesting background for the development of their own roll. The customer has never hesitated to make known his likes and dislikes on various features, and the suppliers have been just as vociferous in stating what could and what could not be built into a roll.

The collection of information from both sides of the picture finally convinced Bagley & Sewall that they should enter the field of building their own suction rolls for their customers, incorporating as many of the desired features as possible, eliminating as many undesirable features as possible, and keeping the cost to a minimum consistent with quality materials and workmanship.

The Pulp and Paper School at Three Rivers, Quebec, known as Ecole Provinciale de Papeteries, is supported and sponsored by the Province of Quebec through the Department of Youth and Social Welfare, the Honorable Paul Sauve, Minister and Gustave Poissen, Deputy Minister.

During this past year, the Bagley & Sewall Co. worked with the School authorities in designing and building one of the most unusual and interesting paper machines in the industry. The faculty thought that in teaching the art and science of paper making to the future paper makers of Canada, they should have a physical unit to work on which would be not just a model or toy, but a machine which would act and give similar results to its big production brothers.

Several years of planning and study preceded even the first line on the drawing board. Now, after over a year on the board and in construction, the machine has been installed at the



DESIGNED FOR THE PULP AND PAPER INDUSTRY . . .

This EDERER roll-handling crane was custom-built to the exact job requirements of the Weyerhaeuser Timber Company's mill at Springfield, Oregon—where it is handling paper rolls fast and efficiently.

Since 1901 EDERER has engineered and built materials handling equipment for the pulp and paper industry—supplying custom-built cranes that pay off in man-hours saved—dollars saved.

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AMERICAN PAPER AND PULP ASSOCIATION'S PAPER AND PRODUCTION RATIO REPORT

(Production as percent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

	July 29	Aug. 5	Aug. 12	Aug. 19	Aug. 26
1950	106.1	106.5	103.9	105.6r	107.6
	July 30	Aug. 6	Aug. 13	Aug. 20	Aug. 27
1949	*84.0*	*85.5*	*85.9*	*89.3*	*90.3*

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1949	*94.6*	*92.8*	*89.1*	*85.1*	*82.7*	*78.6*	*72.8*	*87.6*	*89.7*	*96.8*	*98.2*	*89.8*	*88.0*
1950	97.6	101.1‡	102.6‡	100.9‡	101.8‡	103.2‡	90.8‡						

r Revised.
‡ Preliminary.

COMPARATIVE YEARLY SUMMARIES

	1943	1944	1945	1946	1947	1948	1949	1950
Year to Date	88.2	87.9	87.8	99.9	103.7	97.5	85.5	100.7
Year Average	87.8	88.1	89.4	100.1	104.3	96.2	88.0	

PAPERBOARD OPERATING RATIOS†

	July 29	Aug. 5	Aug. 12	Aug. 19	Aug. 26
1950	96	98	99	101	100
	July 30	Aug. 6	Aug. 13	Aug. 20	Aug. 27
1949	*80*	*82*	*84*	*87*	*86*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1949	*88*	*85*	*79*	*79*	*78*	*75*	*64*	*86*	*87*	*94*	*93*	*83*	*85*
1950	88	92	91	92	91	94	82						

All of the above data is based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association.

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School, and should be ready for operation during the fall term of this school year.

This is believed to be an unusual unit in that it is one of the first laboratory machines ever built which is not only completely flexible for study but is built to dimensions which can produce a wide range of paper products under conditions comparable to full size machine operation.

It is a practical machine. The parts have been scaled down in certain respects to make it workable in a laboratory, but the important dimensions have been held such that the machine will run at commercial speeds and produce a commercial product. In fact, the School hopes to support the cost of its operation through the sale of the paper produced.

The unit is a Yankee Fourdrinier with after dryers. The headbox has glass sides so that the flow and action of the stock can be studied under various conditions.

The Fourdrinier is of the adjustable shake type carrying a 42″ wire 30″ wide, complete with table rolls, suction boxes, dandy roll, and suction couch.

The press section includes a suction press and a plain press. It can be run with a pick-up felt carrying the sheet through the presses and pressure roll to the Yankee; with a top felt on the second press carrying the sheet to the Yankee; with the second press reversed and by passing the Yankee to the first after dryers.

The after dryers are in two sections, six in the first section, four in the second, separated by a size press. Each section of top and bottom dryers is equipped with dryer felts.

The calender is a 9-roll stack with pressure and lift mechanism. The reel and 2-drum winder completes the machine on which it is planned to produce everything from crepe tissue and MG through newsprint and fine papers.

OBITUARIES

Edward John Albert, 79, who retired from the J. R. Booth Co. in 1941, after 20 years' association, died in Ottawa, Ont., following a lengthy illness. He is survived by his widow.

Tommy Gillespie, well known representative of the Lockport Felt Co., Cheney Bigelow and Wyandotte Chemicals died in Lake Villa, Ill.

Mr. Gillespie was a specialist on paper mill supplies and equipment and was one of the best liked men in the vast mid-west territory which he covered.

He is survived by his widow, Edna Gillespie.

Charles Withrow Kellog, 81, of Hudson Falls, a former president and chairman of the board of United Wallpaper Factories, Inc., died August 28 after a brief illness. He retired in 1947 after more than fifty years as an officer and director of the firm.

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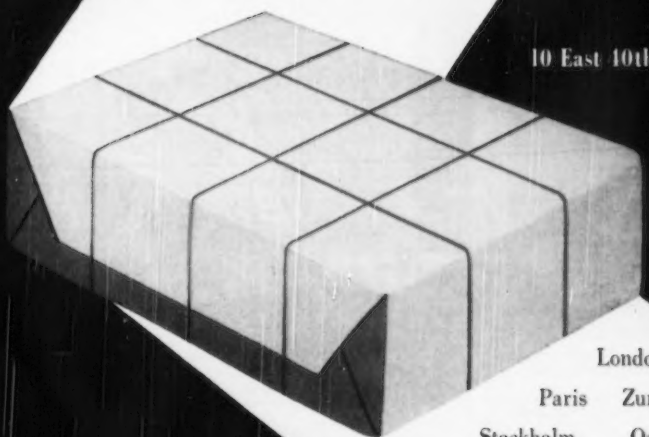

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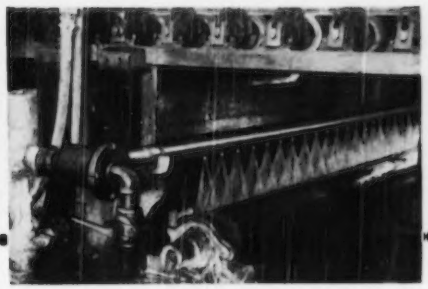

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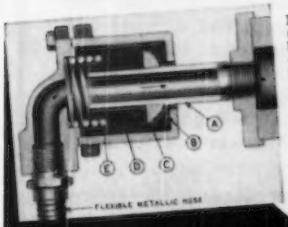

Nipple (A) is fastened to roll or drum. Carbon-graphite ring (B) effects seal against rotating collar (C). Guide (D) supports joint, is also of self-lubricating carbon-graphite. Spring (E) is for initial seating only; in operation joint is pressure-sealed.

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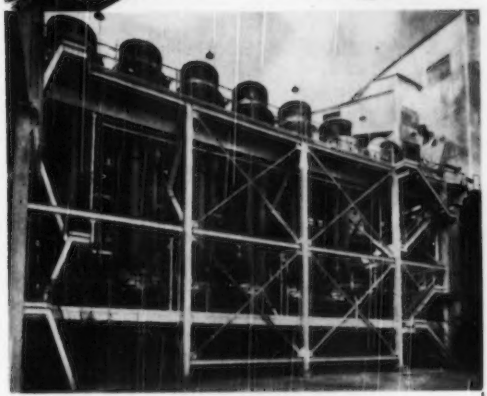

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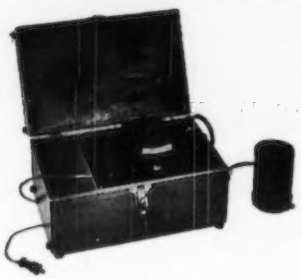

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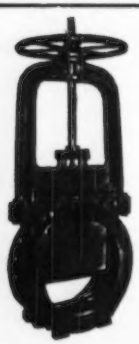

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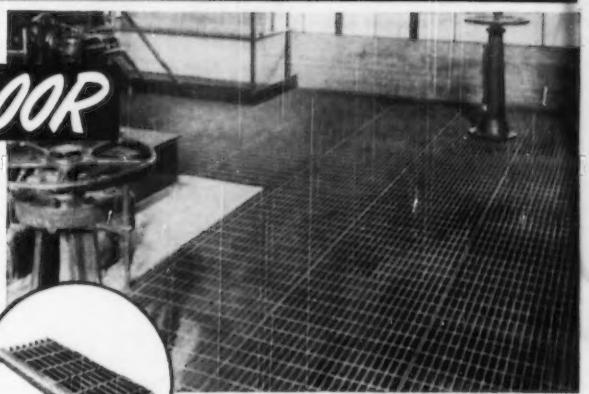

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The Great Northern Grinder For 24" Wood.

Cowan Centrifugal Pulp Screens
Waterous Flat Screens
Paper Machine Reels
Deckers
Cylinder Molds
Hydraulic Grinder Lathes
Automatic Reversible Showers

Roll Heading Presses
Calender Doctors
Langdon Collapsible Winder Shafts
Doctor Blades
Stone Dressing Burrs
White Water Samplers
Etc. Etc. Etc.

MONTAGUE MACHINE COMPANY
Turners Falls, Mass.

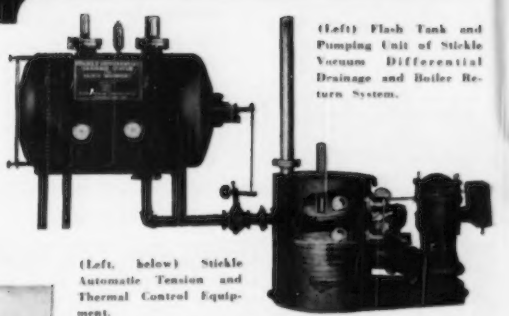
Better Paper! Bigger Profits! with STICKLE Drainage and Control

Do away with wrinkled rejects, wasted steam, excessive fuel costs, in the manufacture of paper! Stickle Drainage and Control equipment is designed to solve *all* these problems—increase output, improve quality, save you *money!*

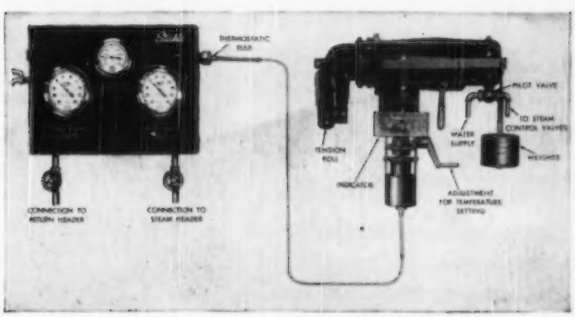
Applied to your driers, the Stickle Vacuum Differential Drainage and Boiler Return System provides positive, uninterrupted circulation of steam . . . rapidly removes air and condensation . . . returns condensate to boiler at maximum temperature, saving 10-15% of your fuel.

Stickle Automatic Tension and Thermal Control accurately controls sheet moisture within one-half of 1% variation . . . stabilizes steam flow to the machines . . . checks overheating of driers . . . eliminates manual control to the greatest degree.

Used together in the manufacture of paper, Stickle Drainage and Control Equipment makes a neat contribution to paper mill profits! Investigate *today!*



(Left) Flash Tank and Pumping Unit of Stickle Vacuum Differential Drainage and Boiler Return System.



(Left, below) Stickle Automatic Tension and Thermal Control Equipment.

FREE! Generously illustrated, 24-page Stickle Bulletin No. 160, devoted entirely to proved and tested cost-cutting methods for paper mills. Send for your copy!

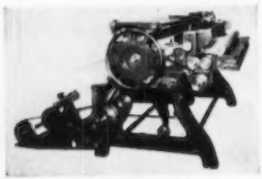
STICKLE EQUIPMENT

STICKLE STEAM SPECIALTIES COMPANY
2223 Valley Avenue • Indianapolis, Indiana

STANDARD & FACIAL TISSUE ROLL CONVERTERS

WITH OR WITHOUT

Latest Improvements: Parent Roll Drive with Automatic Tensioning—Velvet Smooth, Quick Accelerating Clutch—Roll Wrappers That Will Handle Varying Diameters.



Slitters and Rewinders for Vulcanized Fibre and Heavy Board

•

Towel Interfolders for single interfold

•

Special Machinery

Rotary Card Cutters

•

Spiral Tube Machines for Toilet Roll Cores

•

Designing

DIETZ MACHINE WORKS

Factory-Office: 126 W. Fontaine St.

SINCE 1901 **PHILADELPHIA 22, PA., U. S. A.**

"TAPPING A BATCH"

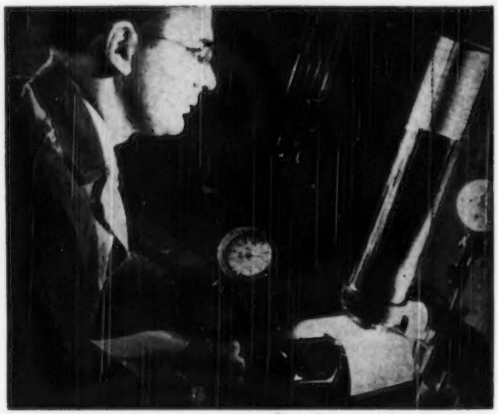
Every batch that goes into a Chief Sandusky Centrifugal Casting is of the same high quality. Virgin metals and composition ingot of the highest quality available are always used. Close control of melting atmospheres with accurate pyrometric control of temperature insure uniform, top grade alloys.

ON THE JOB
READY FOR THE
FINEST OF CASTINGS

Specify Chief Sandusky Castings from your machine builder.

CHIEF SANDUSKY *CENTRIFUGAL CASTINGS*

SANDUSKY FOUNDRY AND MACHINE CO. SANDUSKY OHIO, U.S.A.



Photo, Courtesy J. M. Huber Corporation

Single Instrument Measures Smoothness, Porosity and Softness of Paper

You just interchange the lower test plates in the GURLEY-HILL S-P-S Tester to convert it into an instrument for testing either smoothness, porosity or softness of any type of paper, by measuring a given air-leakage over or through the paper.

This 3 in 1 laboratory "assistant" is simple to operate, quick and accurate, and a real utility instrument where printing quality of paper must be reliably measured.

Bulletin No. 1400 describes the S-P-S Tester as well as other Gurley paper testing instruments. It's worth writing for today. W. & L. E. Gurley, 520 Fulton St., Troy, New York.

PARAFFIN & MICROCRYSTALLINE WAXES

NATIONAL WAX CO.

CARLOADS — TANK CARS — TRUCKS

NATIONAL WAX COMPANY

1300 WEST DIVISION STREET

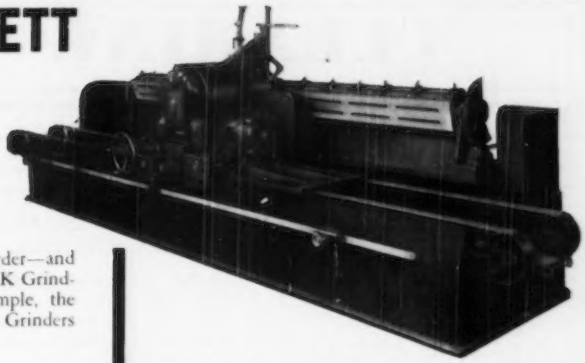
CHICAGO 22, ILLINOIS

NATIONAL WAX CO.

WHO USES HANCHETT

Mammoth AK Knife and Shear Blade Grinders—

AND HOW MANY?



Big names tell a big story—and when they reorder—and reorder again—you know that HANCHETT AK Grinders have proved their superiority! As a sample, the mills in this month's feature article have AK Grinders in daily operation:

COOSA RIVER NEWSPRINT COMPANY
(Nine machines in Kimberly Clark Mills)

CROWN-ZELLERBACH CORPORATION
(Nine machines in Crown Zellerbach Mills)

EVERETT PULP AND PAPER COMPANY

FIBREBOARD PRODUCTS, INC.

WEYERHAEUSER TIMBER COMPANY
(Ten machines in Weyerhaeuser Mills)

And as these and other concerns expand and modernize their mills, they continue to *add more* HANCHETTS as needed. That's because the AK *pays its way*—in *better* knife and shear blade grinding for *better* mill production.

Write for Bulletin PTJ-90 and complete information.

HANCHETT MANUFACTURING COMPANY

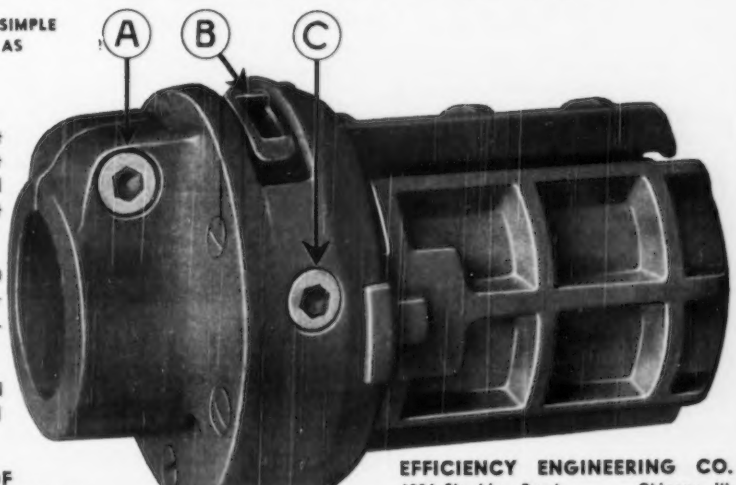
World's Largest Manufacturers of Knife Grinding Machinery

Main Office: BIG RAPIDS, MICHIGAN
West Coast: PORTLAND, OREGON

CHUCK PROBLEM SOLVED

APPLYING-EXPANSION-CHUCKS

AS SIMPLE AS



INSTRUCTIONS

A—TO LOCK CHUCK at proper position on shaft insert hex wrench and tighten down socket bolt **A** firmly.

B—TO LOCK ROLL TO SHAFT insert flat bar tool at **B** and pull upward firmly.

C—TO LOCK EXPANSION —insert hex wrench and tighten socket bolt **C**.

EFFICIENCY ENGINEERING CO.
4804 Sheridan Road Chicago, Ill.

EXCLUSIVE FEATURES OF EFFICIENCY EXPANSION CHUCKS

1—Both shaft and core are positively locked together.
2—Perfect alignment is assured.
3—It expands into place.
4—Solid and positive drive.
5—Equally effective for returnable—non-returnable—or metal cores.
6—No lefts or rights—Each chuck of a pair is the same.
7—Withstands unlimited tension.

CLEARING HOUSE

HELP WANTED

MEN WANTED POSITIONS OPEN

Two mill managers cylinder machine roofing felt and board mills; two superintendents for roofing felt mills; fourdrinier and cylinder machine foremen; beater engineers.

Chemists, chemical engineers and laboratory assistant; machine tenders and back tenders; millwright foreman, mechanical engineers, draftsmen and head draftsman; project engineers; cutting department foreman and envelope machine adjustor; bleaching foreman; color mixer wallpaper manufacturing plant.

We invite correspondence (confidential) with mills seeking executives and with executives seeking new positions.

CHARLES P. RAYMOND SERVICE INC.
294 Washington St., Boston, Mass.
S-7

CHEMIST

Synthetic Resin Latex Supplier is establishing a laboratory to evaluate and promote its products in the paper industry. It is seeking a chemist with 8 to 10 years experience in paper chemistry to head the project. Excellent opportunity for a person with necessary qualifications. Salary commensurate with experience record.
Box 50-427 care Paper Trade Journal. S-7

BOSS MILLWRIGHT

Middle West paper mill has opening for man age 30 to 45. Prefer man with some technical background and plenty of practical experience. Excellent opportunity. Replies confidential. Write complete personal and business history to Box 50-412 care Paper Trade Journal. S-21

ENGINEER

Technical Graduate with pulp and paper mill experience for office and field work in consulting engineering office located in Middle West. Write Box 50-414 care Paper Trade Journal. S-7

ASSISTANT SUPERINTENDENT

Wisconsin tissue mill has opening for assistant superintendent. Combination of technical training and machine experience preferred, but all applicants will be considered. Replies confidential. Write Box 50-410 care Paper Trade Journal. S-21

WORKING SUPERINTENDENT for small, fast growing Eastern mill making lightweight specialties. Cylinder machine experience essential. State qualifications and salary expected. Address Box 50-378 care Paper Trade Journal. TF

LARGE PAPER MACHINERY MANUFACTURER interested in securing services of an assistant superintendent of machine shop, also erecting men for shop and field work. In reply, please state age and experience. Address Box 50-435 care Paper Trade Journal. S-21

HELP WANTED

ENGINEERING DRAFTSMEN AND DETAILERS

Several required—experience in Paper Mill machinery or heavy equipment preferred. Permanent positions—State qualifications and salary expected.

The Appleton Machine Company
Appleton, Wisconsin
S-14

SALARIED POSITIONS $3,500—$35,000
If you are considering a new connection communicate with the undersigned. We offer the original personal employment service (40 years recognized standing and reputation). The procedure, of highest ethical standards, is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
117 Dun Bldg., Buffalo 2, N. Y.
TF

MILL IN THE EAST

starting up a new cylinder machine to run Tissue paper needs Machine Tenders and Back Tenders. Give Reference. Apply Box 50-403. Care Paper Trade Journal.
S-14

OPERATOR AND SUPERVISOR Hamblet Sheeter, Seybold Cutter, Cameron Slitter. Small plant, Brooklyn. Send full details. Address Box 50-337 care Paper Trade Journal. S-7

LABORATORY ASSISTANT wanted for eastern specialty paper mill. Interesting work includes some in pilot plant. Recent technical graduate preferred. Address Box 50-434 care Paper Trade Journal. S-7

WANTED—Master Mechanic thoroughly familiar with Board Mill operation. Excellent opportunity for right man. Please give full particulars in first letter. Address Box 50-428 care Paper Trade Journal. S-28

WANTED—Experienced Welder for Board Mill. Only men interested in a permanent position with a growing concern need apply. Good working conditions and good hourly rate. Address Box 50-429 care Paper Trade Journal. S-28

HELP WANTED

WANTED — Experienced Machine Tender, Backtender and Beater Engineer, for cylinder machine, making all grades of folding box and .016 test liner. Give resume of past experience, reference and age in first letter. Address Box 50-430 care Paper Trade Journal. S-14

SUPERINTENDENT to make facial tissue on cylinder machine. Only men with utmost experience in that field need apply. Compensation for man fitting position will be very satisfactory. Address Box 50-424 care Paper Trade Journal. S-7

WANTED—YOUNG MAN, 30, 40, technical graduate, experienced supervising operations of Paper or Roofing Felt Mill, wanted for position of superintendent with nationwide, progressive building materials manufacturer. State age, experience, education etc., in letter to Box 50-422 care Paper Trade Journal. S-14

SITUATIONS WANTED

EXECUTIVE ACCOUNTANT

Capable organizational and supervisory ability. 20 years administrative experience in folding carton, paperboard and printing industry. Available immediately. Box 50-540 care Paper Trade Journal. S-21

EXPERIENCED KRAFT PULP AND PAPER MILL ENGINEER AND OPERATOR

wants to contact mills.

Cement Sacks, Gumming, Envelopes and other Specialties.

Address Box 50-439 care Paper Trade Journal. N-2

RESEARCH DIRECTOR—20 years experience in peace and wartime Research, Production, Manufacturing, paper converting, synthetic coatings, adhesives, decorative, ordnance, functional, building, industrial, anti-corrosive papers, foodwraps, imagination, know how, initiative, products, processes seeking new responsibilities with well established company in Research Management. Address Box 50-436 care Paper Trade Journal. pat. pend.
S-21

OVER TWENTY YEARS EXPERIENCE in finishing department with specialties and fine papers. Middle aged, reliable, seeking advancement to foreman or assistant superintendent. Prefer central location. Address Box 50-441 care Paper Trade Journal. S-14

TOUR BOSS—Thoroughly experienced on Test Liner and all grades of Boxboard. Good references. Address Box 50-437 care Paper Trade Journal. S-21

B. S. CH. E. WITH WILL TO SUCCEED, recent graduate, veteran, married, interested all phases pulp and paper mill operations. No geographical restrictions. Address Box 50-420 care Paper Trade Journal. S-7

RATES FOR CLASSIFIED ADVERTISING

HELP WANTED—10c a word. Double rate for heavy face type. Minimum charge $2.50.

SITUATIONS WANTED—10c a word, double rate for heavy face type. Minimum charge $2.50. If repeated ½ rate will be charged for each consecutive repetition.

FOR SALE—10c a word. Double rate for heavy face type. Minimum charge $2.50.

WANTED—10c a word. Double rate for heavy face type. Minimum charge $2.50.

OPPORTUNITIES—10c a word. Double rate for heavy face type. Minimum charge $2.50.

Classified advertising space may also be purchased at $5.00 per single column inch. All classified advertisements are payable in advance. If box number is used—70 cents additional.

Address replies to advertisements appearing under Box Numbers in care of PAPER TRADE JOURNAL, 15 West 47th Street, New York 19, N. Y.

SITUATIONS WANTED

MILL SUPERINTENDENT or **TECHNICAL DIRECTOR**—Chemical background, 13 years practical and technical experience in fine paper specialties, book papers and wrappings. Married, 42 years old, available immediately. Address Box 50-423 care Paper Trade Journal. S-7

PLANT MANAGER—Board and Paper Conversion; employed; seeks opportunity in company needing cost-minded executive with proven production record and excellent labor relations history. Address Box 50-385 care Paper Trade Journal. S-28

SALES EXECUTIVE — 48, Member T.A.P.P.I., S.A.P.I., wide acquaintance with publishers, Converters, Merchants, Printers. Experienced Book, Bond, Coated, Groundwood, Sulphate. Capable manager. Personable. Aggressive. Available October 15. Address Box 50-404 care Paper Trade Journal. TF

GRADUATE CHEMIST — Technologist. 14 years experience research development technical control in coarse papers and board. Desires laboratory or mill position. Any location. Immediate availability. Address Box 50-417 care Paper Trade Journal. S-21

MASTER MECHANIC—25 years practical experience in maintenance and construction of several plants, also engineering training. Age 43. Best references. Address Box 50-418 care Paper Trade Journal. S-21

SITUATIONS WANTED

CHEMICAL ENGINEER BS—10 years responsible position in Research development, pilot plant and technical service in viscose, cellulose and nitrocellulose. Desires position in Research and Development with progressive organization. Address Box 50-415 care Paper Trade Journal. S-7

SUPERINTENDENT—27 YEARS OF PRACTICAL EXPERIENCE on Fourdrinier and Cylinders, manufacturing the following grades: all kinds sulphite, groundwood, kraft specialties and de-inking old papers for high grades, all kinds of folding box board. Can get you quality and production. Best of references. Address Box 50-406 care Paper Trade Journal. S-21

PLANT ENGINEER—Experienced in large sulphite specialty pulp and paper mill maintenance and engineering; paper mill design; desires responsible mill connection. Address Box 50-350 care Paper Trade Journal. TF

FOR SALE

FOR SALE—36" Slitter & Rewinder Shear Cut with 3 Rewind Arms; 34", 64" and 96" Rotary Sheeters; 50" Seybold Paper Cutter; 28" x 41" Thomson Platen Die Cutter. Write for listing of over 90 Paper Converting Machines for sale. Address Box 50-392 care Paper Trade Journal. TF

FOR SALE

FOR SALE

100" Horne single knife Sheeter with back-stand.
64" Hamblet Sheeter with Layboy and back-stand.
58" Finley Sheeter.
36" Hamblet Sheeter.
74" Beloit 2-drum Rewinder.
48" Kidder model CH Slitter.
32" Cameron model 24-3A Slitter.
2—Three-color Rotary Printing Presses, 60" wide.
Cottrell 3-color Bag Press.
Flat Cutters, 32", 36", and 44" Power Machines.

Also many good values in Printing, Newspaper & Lithographing Equipment.

THOMAS W. HALL COMPANY, Inc.
120 West 42nd St., N. Y. 18
(Plant at Stamford, Conn.) TF

PAPER COATING MACHINERY MANUFACTURERS — Waxing, Oiling, Carbon, Laboratory Coating and Treating and Flat Ream Measuring and Converting Machines. New improvement. THE MAYER MACHINE COMPANY, INC., 1313 Buffalo Road, Rochester, 11, N. Y. TF

FOR SALE

1—112" Cameron, Type 18, 60" rewind.

BALER
1—Wire Baler.

BEATERS
1—1½ lb. Laboratory Beater.
1—3 lb. Laboratory Beater.
1—300 lb. Beater—iron tub.
1—Dilts Iron Tub Laboratory Beater. Beater roll 14" diameter x 10¼" face, including motor.

CALENDER STACKS
1—72" 5 roll Calendar Stack.
1—2 roll pressure calender—32" x 108".
1—72" 4 roll calender stack. (Extra heavy duty).

CHIPPER
1—96" Murray 4 knife Chipper—anti-friction bearings.

CRUSHER & HAMMERMILL
1—Murray Chip Crusher.
1—Jeffrey Hammermill.

CYLINDER MOLDS
1—30" diameter x 72" face.
1—36" diameter x 79" face.
1—48" diameter x 84" face.
1—36" diameter x 88" face.
2—36" diameter x 54" face.

DECKERS
3—IMPCO 75¼" face x 30" diameter cylinder mold.

DIGESTERS
2—14 ft. Rotary Digesters.

DRIVES
1—#4 Reeves Drive.
1—#3 Reeves Drive.
1—#5 Reeves drive.

V-BELT DRIVE
1—21¼" diameter x 7¼" face, 5 groove.
1—16½" diameter x 7½" face, 5 groove. (With clutch).

DRYERS
1—Complete unit, consisting of 6 dryers, 36" diameter x 38" face, including frames, gears, anti-friction bearings.
2—42" diameter x 74" face.
7—24" diameter x 48" face.
4—36" diameter x 72¼" face, with gears and bearings
1—48" diameter x 91" face.
1—36" x 143".
1—24" x 130".
3—36" diameter x 96½" face.
1—48" diameter x 70" face.
2—48" diameter x 92" face.
1—48" diameter x 82" face.
2—36" diameter x 76" face.
23—36" diameter x 70" face—complete.

EMBOSSER
1—84" Hudson Sharp Toilet Embosser. Spare engraved roll.

FELT CONDITIONER
1—146" Nash Felt Conditioner.

FLAT SCREENS
1—6 plate Shartle Flat Screen.

FRAMES
Vertical frames for 100 dryers, 48" diameter, with bearings.

JORDANS
2—Noble & Wood Mammoth Junior.
1—Noble & Wood Mammoth Senior.
1—Emerson Jordan—25 to 30 tons capacity —iron plug including new spare iron plug.

LABORATORY EQUIPMENT
1—3' Shartle Hydrapulper, with motor.

LIME SLUDGE FILTERS
2—IMPCO Lime Sludge Filters, vacuum type, 5' diameter x 4' face.

MISCELLANEOUS
1—Caustic Mixer.

MOTORS
Write us regarding your requirements.

PRESSES
3—Sets Primary Presses, complete, 145" face. Anti-friction bearings. Also all types of rolls for 145" wet end.

PULLEYS
Various cone and assorted pulleys.

PULP BALER
1—140 ton hydraulic Pulp Baler. (Practically new).

PULPERS
1—Jones Pulper. Complete with motor and drive.
1—Noble & Wood Pulper—Iron Tub.

PULP PRESSES
2—Pulp Presses 76" wide (Kamyr Type).

PUMPS
Various sizes of Centrifugal and Plunger Pumps. Write us regarding your particular requirements.

REEL
1—104" two bowl reel.

ROLLS
Felt, Table, Press, Breast, Couch, etc. Various sizes and types. (Bronze, Rubber, Iron, etc.)

ROTARY SCREENS
1—#2 Bird Rotary Screen.
1—#2A Bird Rotary Screen.
3—#2A Cylinders. (only for Bird Rotary Screens). (Chrome plated).

SAVEALLS
1—#4 Bird Saveall.

SHEETERS
1—136" Moore & White Sheeter, duplex with layboy.
2—36" Sheeters.
2—46" Sheeters.
2—50" Sheeters.
1—82" Clark Sheeter (Simplex.)

SLITTERS AND WINDERS
1—84" Cameron—Type S-10.
1—30" Cameron—Type 24 SL.
1—42" Cameron—Type 40-4 R
3—42" Cameron—Type 24-2-A.
1—42" Cameron—Type 9-S
1—42" Cameron Constant Tension with pneumatic control.
1—115" 2 drum Waldron.
2—112" Cameron Type 18.

STOCK PUMPS
1—10 x 20 Shartle Duplex.
1—7 x 16 Shartle Duplex.
4—7 x 16 Shartle Triplex.
1—10 x 20 Shartle Triplex.
2— 8 x 18 Shartle Duplex.
Advise us to your requirements

SUCTION BOXES
5—Suction Boxes, 82" drilled face x 6" wide.

SUCTION COUCH ROLL
1—Sandusky 14⅞" dia. x 103" drilled face.

VACUUM PUMPS
1—#1 Nash Hytor.
1—#3 Nash Hytor.
1—#6 Nash Hytor.

VAT
1—Iron end Vat only, for decker or saveall suitable for cylinder mold 36 x 130.

WASHERS
1—3 cylinder Washer 30" diameter x 75" face cylinder mould.

WAXING MACHINES
1—72" Mayer Waxer.
1—80" Potdevin Waxing Machine.

YANKEE DRYERS
3—Yankee Dryers 84" diameter x 52, 53 and 62" face.

We are always in the market to purchase your surplus or idle machinery. What have you to offer? Wanted Cylinder and Fourdrinier Machines (complete mills).

Paddy Ross, Pres. **J. J. ROSS COMPANY** Ben Kurs, Treas.
250 Frelinghuysen Ave. Tel.—Bigelow 3-3720 Newark 5, N. J.

FOR SALE

REBUILT ELECTRICAL MACHINERY

AC MOTORS (3 ph. 60 cy.)

HP	Make	Wdg	Spd.	Type
500	G.E.	S.R.	450	I M
300	G.E.	S.R.	450	I M
300	West.	S.R.	600	CW
160	G.E.	S.C.	600	I K
150	G.E.	Syn.	600	ATI
150	G.E.	S.C.	695	KT562Y
150	Westgh.	Syn.	450	3 Brg.
150	West.	S.C.	600	CS
125	West.	Syn.	277	
120	Cr. Wh.	S.R.	290	
100	G.E.	S.R.	450	I M
75	West.	S.C.	865	MS
60	West.	S.C.	1160	CS505
50	A.C.		1750	
50	Al.Ch.(new)	S.C.	(HI-Torq.)1130	
35	G.E.	S.C.	1150	I K
30	Vert. G.E.	S.C.	1150	KT526
30	Al. Ch. (new)	S.C.	(HI-Torq) 1685	ARH
25	C.Wh.	S.C.	600	SC504
25	500 v. West.	S.C.	1750	CS365
25	Cr.Wh.	S.C.	865	
25	Cr.Wh.	S.R.	580	1210
20	Al. Ch. (new)	S.C.	(HI-Torq) 1685	ARWHH

HP	Make	Wdg	Spd.	Type
20	West.	S.C.	1750	CS343F
15	West	S.C.	1750	CS326
15	L.A.	S.C.	3600	Fr. 324
10	West.	S.C.	570	CS506C
10	West.	S.C.	870	CS464C
10(6)	West.	S.C.	1280	CS370C
10	West.	S.C.	1750	CS371G
7½	Comm.	S.C.	865	P326
7½	West.	S.C.	1440	CS254Y
5	West.	S.C.	585	CS546
5	West.	S.C.	150	254
5(2)	West.	S.C.	1200	CS
5/1½	L.A.	S.C.	500/1600	2555
5	Master	S.C.	1125/37	PA
5	Burke	S.C.	420	EM2
3	West.	S.C.	1180	CS
3	West.	S.C.	1750	
2	West.	S.C.	600/1200	CS324
2	550v. West.	S.C.	1750	CS224

TRANSFORMERS

6—75 KVA. G.E. 2300v-115/230v.
6—75 KVA. G.E. 2300v-230/460v.
3—200 KVA. Penna. 2400v.-240 v.

MOORHEAD ELECTRICAL MACHINERY CO.

OAKDALE, PA., Pittsburgh District — Pittsburgh Tele. WAlnut 1-4300 S-7

FOR SALE

2—Shartle Class A Horizontal, Centrifugal Pumps, Bronze Fitted, including base extended for motor, direct connected by flexible coupling, size 8"—At. 10" suction, capacity approximately 1600 gallons per minute.

2—Shartle Gate Valves, standard, rising stem, 6" size.

Industria, Inc., 52 Broadway, New York 4, N. Y. S-7

CHESTNUT WET LAP FOR SALE

8 Air Dry Tons per day of pure chestnut wet lap 60% air-dry. Available for immediate shipment. Write for details and sample.

CHAS. A. SCHIEREN COMPANY
Bristol, Virginia S-7

For Sale and Wanted
all grades

WASTE PAPER
GLOVE CO., INC.
557 Water St., N. Y. ORegon 3-6160-1-2-3
Inquiries Solicited S-7

FOR SALE OR LEASE—Several Coating and Laminating Machines available for manufacture of Government specification papers. Address Box 50-400 care Paper Trade Journal. S-7

FOR SALE

1—Rotex screen, style No. 81 5' x 10' wire size.

1—Push bar feeder, Welded construction of ¼" steel plate. Used for feeding wood chips. Conveyor 5' wide. Steel bars 2" x 2" x 48" spaced on 12" centers. Center to center distance head to tail sprockets 22'9".

1—Waytrol FO type #200 with #3—14" x 14" pan. Hand feeder with control box. Transformer for 110V, 1 ph., 60 cyc., A.C. current. Waytrol serial No. W 234. Feeder serial No. 7128.

1—Waytrol FO type with #3—18" x 24" pan. Hand feeder with control bars. Transformer for 110V, 1 ph., 60 cyc., A.C. current. Waytrol serial No. W 275. Feeder serial No. 7529.

1—Rotex sifter, style 7, serial No. 15047. Pulley speed 420 to 460—40" wide x 7'4¼" long.

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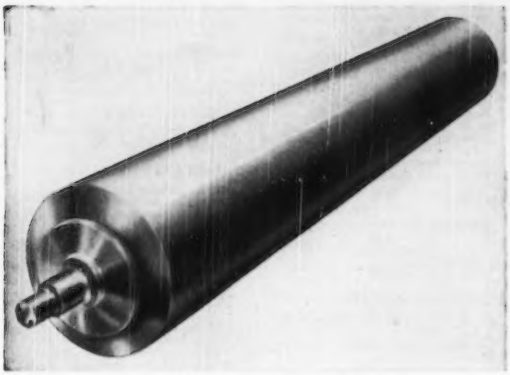

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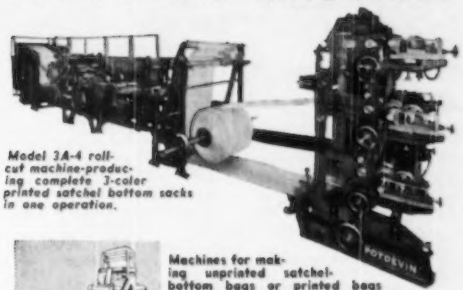

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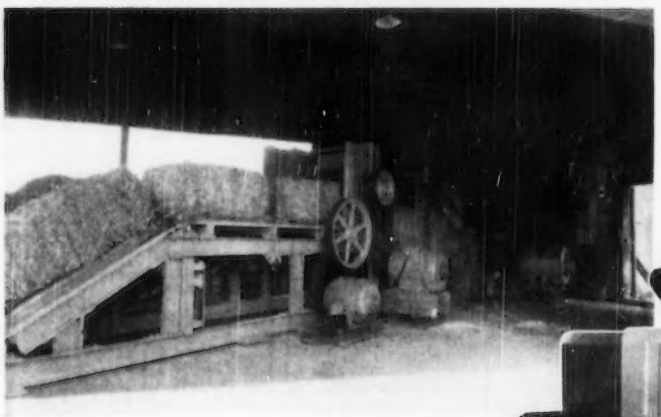

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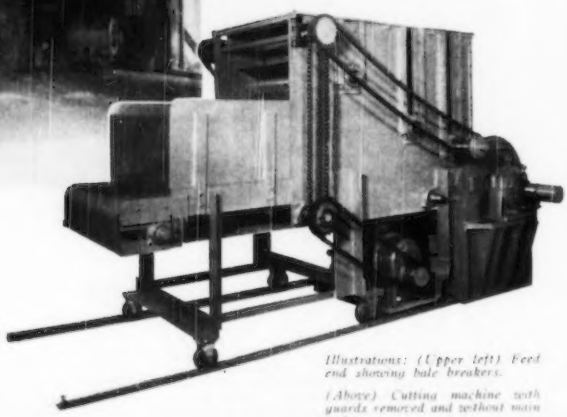

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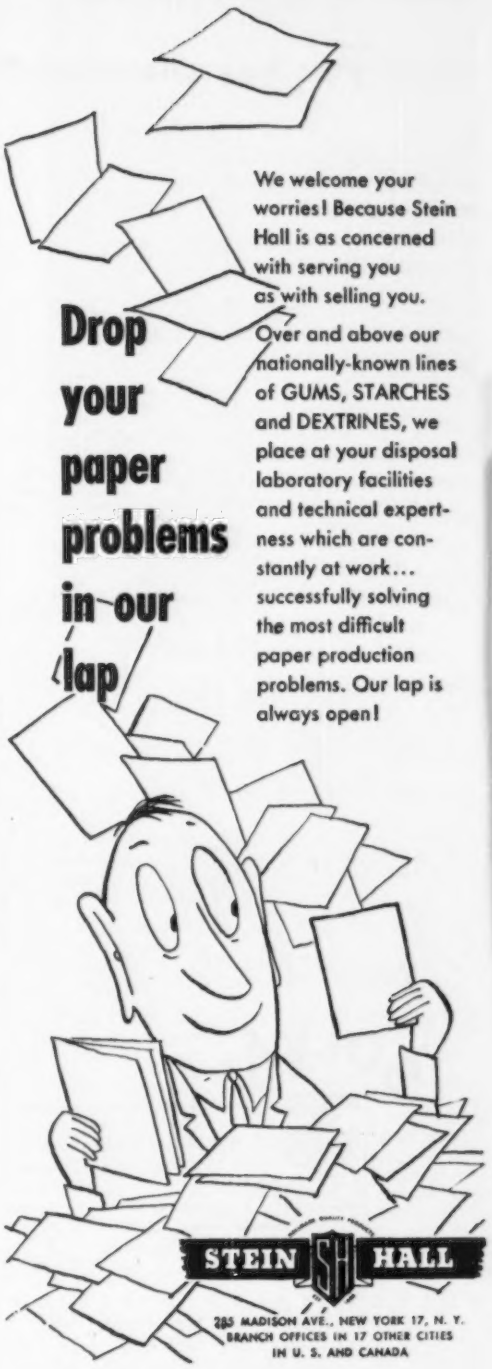
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The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Waldron Corp., John

FILLERS
American Cyanamid Company, Industrial Chemicals Division
A. M. Meincke & Son, Inc.
Vanderbilt Co., R. T.
Wyandotte Chemicals Corp., Michigan Alkali Div.

FILTERS
Bird Machine Company
Green Bay Fdy. & Mch. Co.
Hardinge Company, Inc.
J. M. Huber Corp.
Hungerford & Terry, Inc.
Johnson Corp.
Moore & White Co.
J. O. Ross Engrg. Corp.
The Sandy Hill Iron & Brass Works
Walworth Company

FITTINGS
Crane Company
Shartle Bros. Mch. Co.
Walworth Company

FLEXIBLE COUPLINGS
John Waldron Corp.

FLOORING, GRATING AND TREADS
The Goodyear Tire & Rubber Company
Norton Co.

FLOW BOXES, STAINLESS-CLAD
Lukens Steel Co.
The Sandy Hill Iron & Brass Works

FORK LIFT TRUCKS
Towmotor Corp.

FORMATION
Thwing-Albert Instrument Co.

FORMING MACHINES
Black Clawson Company
Downingtown Mfg. Co.
The Moore & White Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

FREENESS TESTERS
Testing Machines, Inc.

GASKETS
The Goodyear Tire & Rubber Company

GEARS
Black Clawson Company
De Laval Steam Turbine Co.
Downingtown Mfg. Co.
Frank W. Egan & Co.
Farrel-Birmingham Co.
E. D. Jones & Sons Co.
Link Belt Company
Moore & White Co.
D. J. Murray Mfg. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.
Westinghouse Electric Corp.

GRINDERS
Bridgeport Safety Emery Wheel Company
Carthage Machine Co.
Farrel-Birmingham Co.
Gibbs-Brower Company, Inc.
Lobdell Co.
Norton Company
Samuel C. Rogers and Company
The Sandy Hill Iron & Brass Works

GRINDING WHEELS
Norton Company

GUIDES, WEB
The Moore & White Co.
Mount Hope Machinery Co.
Bound Brook Engrg. Co.
John Waldron Corp.

GUMMING MACHINES
Dilts Machine Works
The Sandy Hill Iron & Brass Works

GUMS
National Starch Products, Inc.
Stein-Hall Co., Inc.

HEADS
Babcock & Wilcox Co.
Lukens Steel Company

HEAT EXCHANGERS AND RECOVERY SYSTEMS
Davis Engrg. Corp.
Stickle Steam Specialties Co.
Westinghouse Electric Corp.

HEATING, VENTILATING & AIR CONDITIONING
The Appleton Machine Co.
Davis Engrg. Corp.
E. D. Jones & Sons Co.
General Electric Co.
Leeds & Northrup
D. J. Murray Mfg. Co.
Red-Ray Mfg. Co., Inc.
Ross Engineering Corp., J. O.
Stickle Steam Specialties Co.
Valley Iron Works Co.
Westinghouse Electric Corp.

HOSE (Air, Water, Suction, etc.)
The Goodyear Tire & Rubber Company

HUMECTANTS
Aktivin Division, Heyden Chemical Corp.
Nopco Chemical Co.
Wyandotte Chemicals Corp., Michigan Alkali Div.

IMPREGNANTS
American Cyanamid Company Industrial Chemicals Division

INDENTING MACHINES
Dilts Machine Works

INDUSTRIAL TRACTORS
Towmotor Corp.

INKOMETER
Thwing-Albert Instrument Co.

INSTRUMENTS, TESTING AND MEASURING
Bauer Brothers Co.
Beckman Instruments, Inc.
Bunge Pulp & Paper Co.
N. P. Bowsher
General Electric Company
W. & L. E. Gurley
National Technical Laboratories
B. F. Perkins & Son
Photovolt Corp.
Taylor Instrument Cos.
Testing Machines, Inc.
Thwing-Albert Instrument Co.

JOINTS
Johnson Corp.
Shartle Bros. Mch. Co.

JORDAN FILLINGS
Appleton Machine Co.
Bahr Brothers Mfg. Co.
E. D. Jones & Sons Co.
Shartle Bros. Mch. Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.

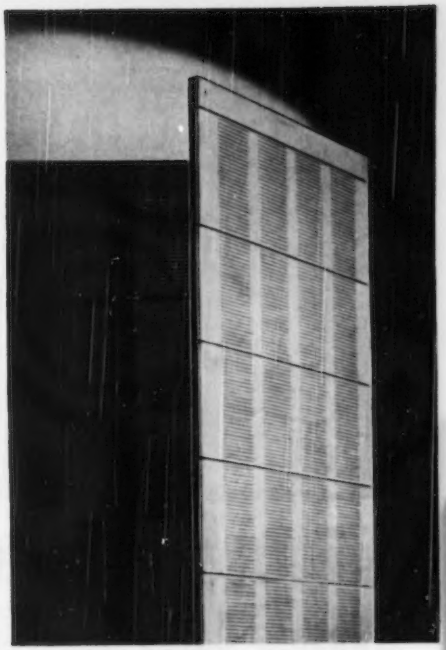
KNIVES
Black Clawson Company
Dilts Machine Works, Inc.
Hamblet Machine Co.
Heppenstall Company
E. D. Jones & Sons Co.
The Moore & White Co.
Taylor Stiles & Co.
Valley Iron Works Co.

KNOT BORING MACHINES
DeZurik Shower Company

KRAFT WRAPPING PAPERS
Canadian Newsprint Supply Co.

LABORATORY CORRUGATOR
Thwing-Albert Instrument Co.

LABORATORY EQUIPMENT
Appleton Machine Co.
Bauer Brothers Co.
Beckman Instruments, Inc.
Bird Machine Company
Dilts Machine Works
W. & L. E. Gurley
E. D. Jones & Sons Co.
Leeds & Northrup Company
National Technical Laboratories



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(3) High, Sustained Yield — You get consistent, uniform quantities of cleaner pulp.

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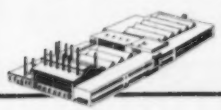

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FITCHBURG, MASSACHUSETTS

Metalworkers for the Paper Trade

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VALVES: GATE, SWING CHECK, BLOW, GLOBE, ANGLE AND "Y"

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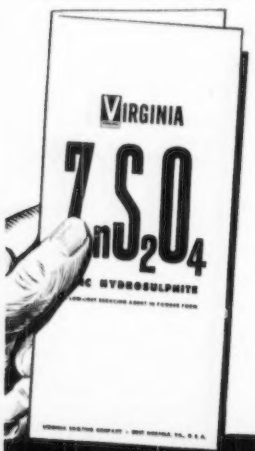

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SINCE

WHERE TO BUY

Taylor Instrument Companies
Testing Machines, Inc.
Valley Iron Works Co.
John Waldron Corp.

LAMINATING COMPOUND
National Wax Company

LAMINATING MACHINES
Dilts Machine Works
John Waldron Corp.

LAY BOYS
Dilts Machine Works
Gibbs-Brower Company, Inc.
Hamblet Machine Co.
Moore & White Co.

LINTER COTTON
Railway Supply & Mfg. Co.

LUBRICANTS
Sinclair Refining Co.
Socony-Vacuum Oil Co.
Sun Oil Company
The Texas Company
Tide Water Associated Oil Co.

MAGAZINE REELS
Dilts Machine Works (Kohler Systems)

MATERIALS HANDLING
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Dilts Machine Works
Industrial Brownhoist
Shartle Bros. Mch. Co.
The Wellman Engrg. Co.

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Farrel-Birmingham Co.
Lobdell Co.
Testing Machines, Inc.

MICRO-CRYSTALLINE WAXES
Bunge Pulp & Paper Co.
Moore & Munger
National Wax Company

MOISTURE CONTENT CONTROL
Stickle Steam Specialties Co.

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Fairbanks, Morse & Co.
General Electric Company
Reliance Electric & Engrg. Co.

NEWSPRINT
Bunge Pulp & Paper Co.
Canadian Newsprint Supply Co.

NICKEL AND NICKEL ALLOYS
The International Nickel Co.

NOZZLES
Link Belt Company

PACKING BOXES
Johnson Corporation
The Moore & White Co.
Shartle Brothers Machine Co.

PAPER CONDITIONING
Vapo Systems Co.

PAPER MACHINE DRIVES
Manchester Machine Co.

PAPER MACHINES
Bagley & Sewall Co.
Black Clawson Company
Downingtown Mfg. Co.
Gibbs-Brower Company, Inc.
Thomas W. Hall Co.
Lukenweld
Moore & White Co.
Pusey & Jones Corp.
J. J. Ross Company
Ross Paper Machy. Corp.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.

PAPER MACHINE SLICES
Black Clawson Company
E. D. Jones & Sons Co.
The Moore & White Co.
The Sandy Hill Iron & Brass Works
Valley Iron Works Co.

PAPER TUBE MACHINERY
Dietz Machine Works
Gibbs-Brower Company, Inc.
Thomas W. Hall Co.
Hudson Sharp Machine Co.
Langston Co., Samuel M.

PARAFFINE WAXES
Moore & Munger
National Wax Company

PARAFFIN WAX EMULSIONS
Nopco Chemical Co.

PASTING MACHINES
Black Clawson Company
Dilts Machine Wks.
Frank W. Egan & Co.
Gibbs-Brower Company, Inc.
Murray, D. J., Mfg. Co.
Moore & White Co.
Potdevin Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Waldron Corp., John

PEBBLE MILLS
F. L. Smidth & Co.

PERFORATED METAL
Allis-Chalmers Mfg. Co.

PETROLATUMS
National Wax Company

pH METERS
Thwing-Albert Instrument Co.

PIPE
Armco Drainage & Metal Products, Inc.
Babcock & Wilcox Co.
Crane Company
Michigan Steel Casting Co.
National Tube Co.
Walworth Company

PIPE FITTINGS
Armco Drainage & Metal Products, Inc.
Crane Company
Michigan Steel Casting Co.
Walworth Co.

PIPE MARKERS
W. H. Brady Co.

PITCH CONTROL
American Cyanamid Company Industrial Chemicals Division
General Dyestuff Corp.
Monsanto Chemical Company
National Aluminate Corp.
Nopco Chemical Co.
Rohm & Haas Co.

PLASTICIZERS
American Cyanamid Company Industrial Chemicals Division
Aktivin Division, Heyden Chemical Corp.
Nopco Chemical Co.

PLATERS
Gibbs-Brower Company, Inc.
Perkins & Son, Inc., B. F.

PLATES
Armco Steel Corp.
Babcock & Wilcox Co.
J. O. Ross Engrg. Corp.
Lukenweld Division
Lukens Steel Company
Timken Roller Bearing Co.

PLUGS
The Appleton Machine Co.
Black Clawson Company
E. D. Jones & Sons Co.
Shartle Brothers Machine Co.

POPE TYPE REELS
Manchester Machine Co.

PRECISION SAMPLE CUTTER
Testing Machines, Inc.
Thwing-Albert Instrument Co.

PRESERVATIVES
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General Dyestuff Corp.

PRESSURE VESSELS STEEL AND ALLOY
Babcock & Wilcox Co.

PRESSURE VESSELS
Chicago Bridge & Iron Co.

PRESSES
Black Clawson Company
Dietz Machine Works
Farrel-Birmingham Co.
Gibbs-Brower Company, Inc.
Thomas W. Hall Co.
Hudson-Sharp Machine Co.
The Moore & White Co.
Potdevin Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works Co.
Waldron Corp., John
H. G. Weber & Co., Inc.
Williams Apparatus Co.

PULP CLASSIFIER
The Bauer Bros. Co.
Thwing-Albert Instrument Co.

PULP CLEANERS
Corp.
Nichols Engrg. & Research

PULP STOCK VALVES
Crane Company
Record Fdy. & Mach. Co.
Shartle Brothers Machine Co.

PULPERS
American Paper Machy. & Engrg Works, Inc.

Bauer Brothers Co.
Dilts Machine Works
E. D. Jones & Sons Co.
Shartle Brothers Machine Co.

PULPS
Brown Company
Bunge Pulp & Paper Co.
Gottesman & Co., Inc.
Lyddon & Co. (America), Inc
Parsons & Whittemore, Inc.
Perkins-Goodwin Co.
Price & Pierce, Ltd.
Pulp and Paper Trading Co.
Restigouche Co., Ltd.

PULPSTONES
Norton Company

PULP TESTERS
Paper and Pulp Testing Laboratories

PULVERIZING MILLS
F. L. Smidth & Co.

PUMPS
American Paper Machy. & Engrg. Works, Inc.
Allis-Chalmers Mfg. Co.
Black Clawson Company
DeLaval Steam Turbine Co.
Dorr Company
Downingtown Mfg. Co.
Fairbanks, Morse & Co.
Gibbs-Brower Company, Inc.
Johnson Corp.
Moore & White Co.
Nash Engineering Co.
Roots Connerswille Blower Corp.
J. J. Ross Company
Ross Paper Machy. Corp.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.

RADIANT BURNERS
Red-Ray Mfg. Co., Inc.

RAG COOKING PROCESSES
The Kinsley Chemical Company
General Dyestuff Corp.
Rohm & Haas Co.

RAG CUTTERS
Gibbs-Brower Company, Inc.
B. F. Perkins & Son, Inc.
Taylor-Stiles & Co.

RECAUSTICIZING PLANTS
The Dorr Company

RECOVERY SYSTEMS
Babcock & Wilcox Co.
Chicago Bridge & Iron Co.
Rodney Hunt Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Pusey & Jones Corp.
Ross Engineering Corp., J. O.
Valley Iron Works Co.

REELS
The Appleton Machine Co.
Black Clawson Company
Dilts Machine Works (Kohler Systems)
Downingtown Mfg. Co.
Hudson Sharp Machine Co.
Moore & White Co.
Rodney Hunt Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
The Smith & Winchester Mfg. Co.

REFINERS
Appleton Machine Co.
Bahr Brothers Mfg. Co.
Bauer Brothers Co.
Dilts Machine Works
Gibbs-Brower Company, Inc.
Anton J. Haug
E. D. Jones & Sons Co.
Morden Machines Co.
Murray, D. J., Mfg. Co.
Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Sutherland Refiner Corp.
Valley Iron Works

REGULATORS
American Paper Machy. & Engrg. Works, Inc.
Allis-Chalmers Mfg. Co.
Armstrong Machine Works
Bird Machine Company
DeZurik Shower Company
General Electric Co.
Johnson Corp.
Leeds & Northrup Company
National Technical Laboratories
Shartle Brothers Machine Co.
Stickle Steam Specialties Co.
Taylor Instrument Companies
Wallace & Tiernan

RESINS
American Cyanamid Company, Plastics & Resins Division
The Dow Chemical Company
The Goodyear Tire & Rubber Company
Hercules Powder Co.
Monsanto Chemical Company
Nopco Chemical Co.
Rohm & Haas Co., Resinous Products Div.

ROLLS
Appleton Machine Co.
Black Clawson Company
Dilts Machine Works
Downingtown Mfg. Co.
Frank W. Egan & Co.
Farrel-Birmingham Co.
Gibbs-Brower Company, Inc.
Lobdell Co.
The Moore & White Co.
D. J. Murray Mfg. Co.
Perkins, B. F., & Sons Co.
Pusey & Jones Corp.
J. J. Ross Company
Ross Paper Machy. Co.
Rodney Hunt Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
U. S. Rubber Co.
Valley Iron Works Co.
Waldron Corp., John

ROLL COVERS
The Goodyear Tire & Rubber Company
Stowe-Woodward, Inc.

ROLL HANDLING EQUIPMENT
Dilts Machine Works (Kohler Systems)

ROLL STANDS
Cameron Machine Co.
Dilts Machine Works (Kohler Systems)
Frank W. Egan & Co.
Moore & White Co.
Potdevin Machine Co.
The Sandy Hill Iron & Brass Works
John Waldron Corp.
H. G. Weber & Co., Inc.

ROPE CARRIERS
Black Clawson Co.
The Moore & White Co.
The Sandy Hill Iron & Brass Works

ROTARY KILNS
F. L. Smidth & Co.

ROTARY STEAM JOINTS
Johnson Corp.
The Moore & White Co.
Shartle Bros. Mch. Co.

RUBBER PRODUCTS
The Goodyear Tire & Rubber Company

SATURATING MACHINES
Dilts Machine Works
Frank W. Egan & Co.
Gibbs-Brower Company, Inc.
Moore & White Co.
Potdevin Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Waldron Corp., John
Weber, Herman G.

SAVEALLS
Bird Machine Company
Chicago Bridge & Iron Co.
Green Bay Fdy. & Mch. Wks.
Hardinge Company

SCALES
Fairbanks, Morse & Co.
Merrick Scale Mfg. Co.
Testing Machines, Inc.

SCREEN PLATES
Bird Machine Company
Fitchburg Screen Plate Co.
Magnus Metal Corp.
Morey Paper Mill Supply Co.
Testing Machines, Inc.

SCREENS
Allis-Chalmers Mfg. Co.
Appleton Wire Works
Appleton Machine Company
Bird Machine Company
Carthage Machine Co.
Dilts Machine Works, Inc.
Downingtown Mfg. Co.
Gibbs-Brower Company, Inc.
Green Bay Fdy. & Mch. Co.
E. D. Jones & Sons Co.
Link Belt Company

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BLEACHED SULPHITE PULP

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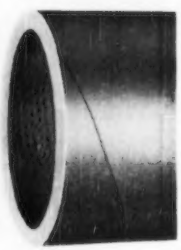

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Moore & White Co.
D. J. Murray Mfg. Co.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works Co.

SHEET MACHINES
Gibbs-Brower Company, Inc.
Thomas W. Hall Co.
Valley Iron Works Co.

SHOWER PIPES
Bird Machine Company
DeZurik Shower Company
Downingtown Mfg. Co.
Moore & White Co.
Sandusky Fdy. & Mch. Co.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.

SHREDDERS
Bauer Brothers Co.
Carthage Machine Co.
Gibbs-Brower Company, Inc.

SIZE PRESSES
Manchester Machine Co.

SIZING
American Cyanamid Company, Industrial Chemicals Division
The Dow Chemical Company
du Pont, E. I., de Nemours & Co.
Hercules Powder Co.
The Hubinger Co.
Monsanto Chemical Company
National Aluminate Corp.
Nopco Chemical Co.
Stein-Hall Co., Inc.
Wyandotte Chemicals Corp., Michigan Alkali Div.

SIZING TESTER
W. & L. E. Gurley
Testing Machines, Inc.
Thwing-Albert Instrument Co.

SLIME CONTROL
The Dow Chemical Company
E. I. du Pont de Nemours & Co.
General Dyestuff Corp.
Monsanto Chemical Co.
National Aluminate Corp.
Rohm & Haas Co.
Vanderbilt Co., R. T.
Wyandotte Chemicals Corp., Michigan Alkali Div.

SLITTERS
Black Clawson Company
Cameron Machine Co.
Carthage Machine Co.
Dietz Machine Works
Dilts Machine Works
Downingtown Mfg. Co.
Frank W. Egan & Co.
Gibbs-Brower Company, Inc.
Thomas W. Hall Co., Inc.
Hamblet Machine Co.
Hudson Sharp Machine Co.
Langston Co., Samuel M.
Moore & White Co.
D. J. Murray Mfg. Co.
Potdevin Machine Co.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Works
Smith & Winchester Mfg. Co.
Valley Iron Works Co.
Waldron Corp., John

SMOKE STACKS
Chicago Bridge & Iron Co.

SOFTNESS-STIFFNESS TESTER
W. & L. E. Gurley
Testing Machines, Inc.
Thwing-Albert Instrument Co.

SOLUBLE OILS
American Cyanamid Company, Industrial Chemicals Division
General Dyestuff Corp.
Nopco Chemical Co.

SPECIAL MACHINERY
Dilts Machine Works
The Sandy Hill Iron & Brass Works
John Waldron Corp.

SPLICING TISSUE
Bunge Pulp & Paper Co.
Williams-Gray Co.

STAINLESS STEEL
Armco Steel Corp.
Michigan Steel Casting Co.
U. S. Steel Corp.

STARCH
A. M. Meincke & Son, Inc.
Clinton Foods, Inc.
The Hubinger Co.
National Starch Products Inc.
Stein-Hall Co., Inc.

STEAM JOINTS
The Moore & White Co.
Shartle Bros. Mch. Co.

STEAM SPECIALTIES
Babcock & Wilcox Co.
Combustion Engrg. Co., Inc.
Davis Engrg. Corp.
Johnson Corp.
Stickle Steam Specialties Co.

STEEL
Armco Steel Corp.
Carnegie Illinois Steel Co.
Lukens Steel Company
D. J. Murray Mfg. Co.
The Sandy Hill Iron & Brass Works
U. S. Steel Corp.

STEEL, CLAD
Babcock & Wilcox Co.
Lukens Steel Company

STEEL TANKS
Chicago Bridge & Iron Co.
The Sandy Hill Iron & Brass Works

STRETCH TESTER
Thwing-Albert Instrument Co.

STUFF CHESTS
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Moore & White Co.
Shartle Brothers Machine Co.
Valley Iron Works Co.

SUCTION BOXES
Black Clawson Company
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Moore & White Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

SULPHITE SPECIALTIES
Canadian Newsprint Supply Co.

SULPHUR
Texas Gulf Sulphur Co.

SULPHUR BURNERS
Valley Iron Works Co.

SULPHUR DIOXIDE
American Cyanamid Company, Calco Chemical Div.
Virginia Smelting Co.

SUPERCALENDERS
The Appleton Machine Co.
B. F. Perkins & Son, Inc.

SYNTHETIC LATICES
American Cyanamid Company Industrial Chemicals Division
The Goodyear Tire & Rubber Company
Nopco Chemical Co.

TAKE OFF UNITS
Dilts Machine Works (Kohler Systems)

TALC
American Cyanamid Company, Industrial Chemicals Division
Vanderbilt Co., R. T.

TANKS
Chicago Bridge & Iron Co.
Kalamazoo Tank & Silo Co.
B. F. Perkins & Sons, Inc.
J. O. Ross Engrg. Corp.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Waldron Corp., John

TEARING TESTERS
Thwing-Albert Instrument Co.
Testing Machines, Inc.

TENSILE TESTERS
Bunge Pulp & Paper Co.
Thwing-Albert Instrument Co.
B. F. Perkins & Son, Inc.
Testing Machines, Inc.
Nopco Chemical Co.

THICKENERS, DECKERS AND SAVEALLS
The Appleton Machine Co.
Bird Machine Company
Carthage Machine Co.
Chicago Bridge & Iron Co.
Dilts Machine Works
Dorr Co.

Downingtown Mfg. Co.
Green Bay Fdy. & Mch. Co.
Hardinge Co., Inc.
Moore & White Co.
D. J. Murray Mfg. Co.
J. J. Ross Company
Ross Paper Machy. Corp.
The Sandy Hill Iron & Brs Works
Shartle Brothers Machine Co.
Valley Iron Works Co.

TITANIUM
American Cyanamid Co., Calco Chemical Div.
E. I. du Pont de Nemours & Co.
Titanium Pigment Co.
R. T. Vanderbilt Co.

TOOLS
Walworth Company

TRACTORS AND TRUCKS
Towmotor Corp.

TRANSMISSIONS
Link Belt Company

TRAPS
Crane Co.
Johnson Corporation
Shartle Bros. Mch. Co.
Stickle Steam Specialties Co.

TUBE MILLS
F. L. Smidth & Co.

TUBES
Babcock & Wilcox Co.
National Tube Co.

TUBING MACHINES
Dilts Machine Works

TUBING, MECHANICAL
National Tube Co.

TUBS
Rodney Hunt Machine Co.
Shartle Brothers Machine Co.
Valley Iron Works Co.

TURBINES
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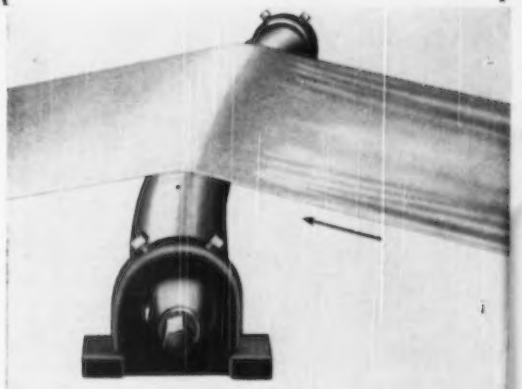

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